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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-259834

(43)Date of publication of application : 22.09.2000

(51)Int.Cl.

G06T 7/00

A61B 5/117

G06F 1/00

G06T 11/00

// G06F 3/00

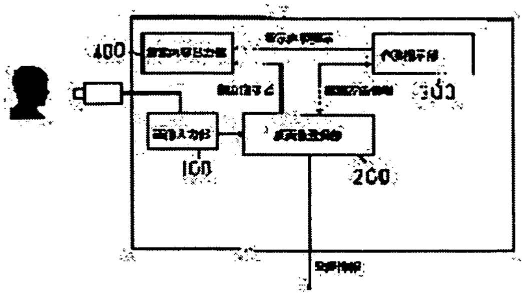
(21)Application number : 11-065405

(22)Date of filing : 11.03.1999

(71)Applicant : TOSHIBA CORP

(72)Inventor :
YAMAGUCHI OSAMU
FUKUI KAZUHIRO
SUZUKI KAORU
YUASA MAYUMI
WAKASUGI TOMOKAZU

(54) REGISTERING DEVICE AND METHOD FOR PERSON RECOGNIZER



(57)Abstract:

PROBLEM TO BE SOLVED: To surely collect the data which are rich in variety by producing and outputting the indication information to indicate a registering method to a person when the face image of an inputted person is converted into the feature value and the registration information generated from the feature value is registered.

SOLUTION: An image input part 100 photographs the face image of a person by a CCD camera, etc., and fetches it to an image face register part 200. The part 200 processes an input image, analyzes the face image to detect a face area, the face parts, etc., extracts the data for authentication and then configures and holds the registration data. In order to acquire the variety of the registration data, a manner indication part 300 gives the indication appropriate to a user to an indication contents output part 400. The part 400 shows the display contents to give the instruction to a human being, i.e., displays, pronounces and utters the signals which are outputted from the reproduction part of the part 300.

CLAIMS

[Claim(s)]

[Claim 1] Registration equipment in person recognition equipment characterized by providing the following An image input means to picturize a person A face image registration means to register registration information which changed into characteristic quantity a person's face image inputted with said image input means, and was generated based on this characteristic quantity A manners directions means to create directions information which directs a registration method to said person in order to register registration information to said face image registration means A contents output means of directions to output directions information generated by said manners directions means

[Claim 2] Registration equipment in person recognition equipment according to claim 1 characterized by having an external information input means for inputting incidental information other than registration information based on said face image, information on said person's condition, and information on other high-grade-registry equipments.

[Claim 3] Registration equipment in person recognition equipment according to claim 1 characterized by having a contents verification means of registration by which registration information on said face image registration means confirms whether predetermined conditions are fulfilled.

[Claim 4] Said manners directions means is registration equipment in person recognition equipment given in three from claim 1 characterized by what is directed using an animation.

[Claim 5] Said manners directions means is registration equipment in person recognition equipment given in three from claim 1 characterized by having a synchronizing means to set up timing which displays the contents of directions in said contents output means of directions, or timing which inputs an image with said image input means.

[Claim 6] Said manners directions means is registration equipment in person recognition equipment given in three from claim 1 characterized by what is directed using voice.

[Claim 7] Said external information input means is registration equipment in person recognition equipment according to claim 2 characterized by the ability to input at least one side of information for checking information which identifies said person's registration information, or said person's registration information.

[Claim 8] Said face image registration means is registration equipment in person recognition equipment given in seven from claim 1 characterized by processing registration information for performing person authentication.

[Claim 9] A registration method in person recognition equipment characterized by providing the following An image input step which picturizes a person A face image registration step which registers registration information which changed into characteristic quantity a person's face image inputted by said image input step, and was generated based on this characteristic quantity A manners directions step which creates directions information which directs a registration method to said person in order to register registration information in said face image registration step The contents output step of directions which outputs directions information generated by said manners directions step

[Claim 10] A person's face image inputted by image input function which picturizes a person, and said image input function is changed into characteristic quantity. A face image registration function to register registration information generated based on this characteristic quantity, A manners directions function which creates directions information which directs a registration method to said person in order to register registration information in said face image registration function, A record medium of a registration method in person recognition equipment characterized by recording a program which realizes the contents output function of directions which outputs directions information generated by said manners directions function.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the registration equipment in person recognition equipment, and its registration method.

[0002]

[Description of the Prior Art] In recent years, in the field of security or a human interface, a person is photoed with a camera and the interest about using for a system using personal authentication, expression recognition, look detection, gesture recognition, lips recognition, etc. based on the information acquired by analyzing the image is increasing.

[0003] From a viewpoint of security, there is a thing using a face, a voiceprint, a fingerprint, the iris, etc. as the individual recognizing method for using human being's biological information. When a face is used also in them, it can recognize without applying a mental and corporal burden, and there is the feature of being easy to use.

[0004] About the recognition method of a face, although there are various research reports and reference, there is reference (red Matsushige: ″research trend of recognition of the face by the computer″ Institute of Electronics, Information and Communication Engineers Vol. 80 No. 3 pp. 257 -266 (1997)) as a survey paper. Recognizing in this reference, using the registration dictionary which searched for the sense of a face and a posture beforehand and suited in each direction, in order to perform face recognition in consideration of the variation of view change, such as sense of a face, is introduced as an example. In this case, it is necessary to acquire beforehand the study sample of face images, such as all postures of the person for discernment, and expression, and to prepare it.

[0005] Although there is the method of applying computer graphics from the image of one sheet, and compounding and registering the sense of another face until now, although how these study samples are collected poses a problem, since complex data is not sufficient quality, it turns out that it is not suitable as a study sample. That is, if it is not the registration sample obtained from live data, a practical recognition rate will not be acquired.

[0006] Saying [obtaining a study sample from live data] needs to have a person for registration actually do a posture and expression. For this reason, although human being who is an explainer had directed beforehand to the person for registration conventionally, in static explanation of only language or drawing, the contents of directions tended to become indefinite and data with a registrant's variety was not able to say that it was fully obtained.

[0007] Moreover, since the use which recognizes not only person authentication but the lips recognition which recognizes a person's expression, a person's direction of a look, opening, a motion of a lip, etc. is also included in person recognition equipment, it is necessary to give a person various directions in the case of those data registration. However, although it was requiring only easy directions of directing to turn to a transverse plane since the transverse-plane face was targetted for many of photography equipments of an old photograph, or recognition equipments using a face, it was difficult many of to acquire automatically the face image which turned to various directions with sufficient variety. Moreover, even if directions were transmitted well, there was no guarantee that the registrant had actually done a posture and expression as directed.

[0008]

[Problem(s) to be Solved by the Invention] In this invention, the equipment for certainly enabling collection of the data which was rich in variety, a method, and a record medium are offered by showing a method, the contents of registration, etc. which are automatically registered in consideration of various variations at the time of registration of a face image.

[0009]

[Means for Solving the Problem] Invention of claim 1 changes into characteristic quantity a person's face image inputted with an image input means to picturize a person, and said image input means. A face image registration means to register registration information generated based on this characteristic quantity, In order to register registration information to said face image registration means, it is registration equipment in person recognition equipment characterized by to have a manners directions means create directions information which directs a registration method to said person, and a contents output means of directions output directions information generated by said manners directions means.

[0010] This invention is performing suitable manners directions, and makes it possible to perform face image collection containing sufficient variety.

[0011] Invention of claim 2 is registration equipment in person recognition equipment according to claim 1 which has an external information input means for inputting incidental information other than registration information based on said face image, information on said person's condition, and information on other high-grade-registry equipments.

[0012] It is possible to perform suitable manners directions, it is taking into consideration an input obtained from the external information input section, and dictionary generation in registration equipment etc. is [this invention is variety's is not only including, but being able to add incidental information to the collected face images, and / semantic attachment of the contents of each collection image becomes possible, and] easy for it.

[0013] Invention of claim 3 is registration equipment in person recognition equipment according to claim 1 characterized by having a contents verification means of registration by which registration information on said face image registration means confirms whether predetermined conditions are fulfilled.

[0014] This invention collects information automatically by verifying whether collected face image information contains variety enough or face image information which suits conditions is collected.

[0015] Invention of claim 4 is registration equipment in person recognition equipment given in three from claim 1 characterized by directing said manners directions means using an animation.

[0016] This invention is using a dynamic image as contents of presentation in a manners directions means, and in order to collect face image data, while sufficient variety is included, signs that it changes dynamically are fed back from a test subject's vision, and remind variety.

[0017] It is registration equipment in person recognition equipment given in three from claim 1 characterized by invention of claim 5 having a synchronizing means to set up timing as which said manners directions means displays the contents of directions in said contents output means of directions, or timing which inputs an image with said image input means.

[0018] This invention can perform automatically image collection in which ** was also based on the contents of presentation regardless of a time gap etc. with a synchronizing means.

[0019] Invention of claim 6 is registration equipment in person recognition equipment given in three from claim 1 characterized by directing said manners directions means using voice.

[0020] In a manners directions means, this invention is using voice as contents of presentation, and in order to collect face image data, even while it can direct with sufficient timing and a screen is not seen, it can be directed to a person.

[0021] Invention of claim 7 is registration equipment in person recognition equipment according to claim 2 characterized by the ability of said external information input means to input at least one side of information for checking information which identifies said person's registration information, or said person's registration information.

[0022] this invention makes it possible to advance registration interactively, and positive face image collection is possible for it -- it comes out.

[0023] It is registration equipment in person recognition equipment given in seven from claim 1 characterized by processing registration information for said face image registration means performing person authentication in invention of claim 8.

[0024] In a face image registration means to change this invention into characteristic quantity from human being's face image, and to register data, characteristic quantity is performing a feature extraction for judging a person's individual human nature, and it is possible for there to be variety, and to be able to collect sufficient quantity of data, and to raise a recognition rate certainly.

[0025] Invention of claim 9 changes into characteristic quantity a person's face image inputted by image input step which picturizes a person, and said image input step. A face image registration step which registers registration information generated based on this characteristic quantity, A manners directions step which creates directions information which directs a registration method to said person in order to register registration information in said face image registration step, It is the registration method in person recognition equipment characterized by having the contents output step of directions which outputs directions information generated by said manners directions step.

[0026] Invention of claim 10 changes into characteristic quantity a person's face image inputted by image input function which picturizes a person, and said image input function. A face image registration function to register registration information generated based on this characteristic quantity, A manners directions function which creates directions information which directs a registration method to said person in order to register registration information in said face image registration function, It is the record medium of a registration method in person recognition equipment characterized by recording a program which realizes the contents output function of directions which outputs directions information generated by said manners directions function.

[0027]

[Embodiment of the Invention] The example of this invention is explained below. Here, after inputting a face image for the candidate for recognition, using a CCD camera etc. as human being's face and performing an image processing, the person recognition equipment which recognizes using pattern similarity etc. is explained.

[0028] <Operation gestalt 1> drawing 1 is drawing having shown the fundamental example of a configuration, and explains each part to details with this operation gestalt 1.

[0029] (1) the image input section image input section 100 from the equipment for inputting a face image into a computer -- becoming -- CCD camera 101 etc. -- it consists of image input means. The example of a configuration is shown in drawing 2 .

[0030] the inputted image -- image input board 102 etc. -- A/D conversion 104 it digitizes -- having -- image memory 103 It is stored. The configuration on 103 and an image input board is sufficient as an image memory, and it is the image input section 100. External memory is sufficient. In addition, it does not limit about the number of picture input devices, but you may consist of two or more number.

[0031] (2) Face image registration **** image registration section 200 The image processing of the input image is then carried out, face image analysis which detects a face field and face components is performed, the data for authentication is extracted, and registration data is constituted and held. Face image registration section 200 The example of a configuration is shown in drawing 3 . Face image registration section 200 The characteristic quantity for registering the face information for recognition is extracted out of the inputted digital image, and it registers with a data base. In this example, the shade information on a face image is taken out as characteristic quantity. In addition, the characteristic quantity of a face image is not limited to this.

[0032] ** Face field detecting-element image memory 103 Face field detecting element 201 out of the stored image The field or head field of a face is detected out of an image.

[0033] The detection method in this example makes a location with the highest correlation value a face field by calculating a correlation value, moving the inside of an image for the template for the face detection prepared beforehand.

[0034] Instead of calculating a correlation value, it is Eigenface. It asks for distance or similarity using law or a subspace method, and face detection means, such as a method of extracting the high location of the similarity, may be used, and a method is not asked.

[0035] Moreover, in order to take out a face field from the head which turned to width greatly, the template of the sideways face of the direction of a number is prepared, and you may use.

[0036] Moreover, when a color picture is used as an image, it is RGB about the color picture. It changes into HSV color space from color space, and using color information, such as a hue and saturation, by field division, it may ask for subregion and a face field, the field of the hair section, etc. may be detected using a region method etc.

[0037] And it is the face components detecting element 202 about a partial image including a face field. It sends.

[0038] ** A face components detecting element, next face components detecting element 202 Face components then, such as an eye, a nose, opening, and an ear, are detected.

[0039] In this example, the location of an eye is detected out of the portion of the detected face field. What is depended on the same pattern matching as face detection, and the method of reference (Kazuhiro Fukui, Yamaguchi **: "a configuration extract and a face focus extract by the combination of pattern matching", the Institute of Electronics, Information and Communication Engineers paper magazine (D), vol.J80-D-II, No.8, pp 2170-2177 (1997)) etc. can be used for the detection method, and a method is not asked.

[0040] ** the characteristic quantity extract section characteristic quantity extract section 203 **** -- characteristic quantity required for recognition is calculated from an input image.

[0041] First, the characteristic quantity for the person authentication using a face is explained.

[0042] In this example, based on the location of components and the location of a face field which were detected, a field is started in fixed magnitude and a configuration and the shade information is used as characteristic quantity. Two combination is considered among some face components detected, and if the segment which connects the two face components focus is settled in the face field detection section at a fixed rate, a field will be changed into a m pixel xn pixel field as a result of a face field extract like drawing 4 (c).

[0043] The case where two components are eyes is explained as an example. The criteria vector of the two directions of a vector perpendicular to the vector which connects the right eye and left eye of drawing 4 (b), and its vector is considered to the input of drawing 4 (a), and the pixel located in a specific distance from the middle point like drawing 4 (b) in two vectors is extracted.

[0044] In this example, the information on a mxn dimension is used for the gray level of each pixel as element information on a feature vector. These contents are not asked about the construction of this feature vector. These processings are performed to a time series image or the input image of two or more cameras.

[0045] While one certain person is looking at near the transverse plane, when an image input is performed, a feature-vector image becomes like drawing 5 , and a lot of data with which parameters differ serially or spatially will be obtained.

[0046] If an example is given about the characteristic quantity of another recognition equipment, the feature extraction to subregions, such as the specific field of a face, for example, a cheek, and opening, will be performed as characteristic quantity for expression recognition. Pinpointing of the location of a cheek or another face components location is performed from the location of the detected face components, and the characteristic quantity for recognition is calculated from the gray level of the field, the variation of a shade, etc.

[0047] As characteristic quantity for look recognition, characteristic quantity is calculated from the circumference of an eye field. The characteristic quantity for recognition will be obtained based on the gray level of an eye field.

[0048] As characteristic quantity for lips recognition, characteristic quantity is calculated from the image around an opening field. For example, it is used as characteristic quantity for recognition of structural characteristic quantity, such as characteristic quantity based on the gray level value of an opening field and closing motion condition of opening, the variation of the motion information accompanying a temporal response, etc.

[0049] ** Registration information generation section registration information generation section 204 It is the characteristic quantity extract section 203. Registration information is generated from the obtained characteristic quantity.

[0050] Let registration information be the subspace obtained by carrying out KL expansion of the characteristic quantity in this example.

[0051] The subspace which lowered the number of dimension of data is calculated by asking for the matrix of correlation of the collected feature vector, and asking for the orthonormal vectors by KL expansion.

[0052] About the image of the mxn pixel obtained as an input configuration, a shade is amended and it recognizes using the feature vector of a mxn dimension. The collected pattern asks for a matrix of correlation C by the following formulas, and is [Equation 1].

It asks for a principal component (characteristic vector) by diagonalizing C. Here, r is the collection number of sheets of data, and Nk. The feature vector is expressed. M pieces are used from what has the big characteristic value to which this characteristic vector corresponds, and it considers as the registration data for recognition of the subspace stretched by these characteristic vectors. The thing of this registration data and subspace is called a dictionary.

[0053] ** Registration information storage section registration information storage section 205 Registration information generation section 204 The generated registration information is held.

[0054] As for registration information, image data besides an ID number etc. is contained. Moreover, it consists of index information which shows whether it is data obtained when subspace (characteristic value, a characteristic vector, a number of dimension, the number of sample data) and this data were what kind of contents of directions.

[0055] moreover, another example describes -- as -- the external information input section 500 from -- it relates with incidental information and memorizing is also possible.

[0056] Face image registration section 200 Basic actuation is explained using drawing 6 .

[0057] Face field detecting element 201 Detection of incorporation (step 2000) and a face field is performed for an input image (step 2001). It is the face components detecting element 202 to the detected face field. The focus of the eyes and the nose is detected (step 2002). Characteristic quantity extract section 203 A pattern is then cut down (step 2003) and a feature vector is generated (step 2004). Next, a continuation judgment of collection is made (step 2005). When continuing collection, processing is again started from the input of an image. When ending collection, it is the registration information generation section 204. Subspace is generated (step 2006). Then, when all collection judges termination (step 2007) and continues collection, processing is again started from the input of an image. When ending collection, it is the registration information storage section 205. Subspace is recorded (step 2008).

[0058] (3) Manners directions section 300 manners directions section 300 The suitable directions for a user are given for the purpose of acquisition of the variety of registration data.

[0059] Manners directions section 300 The example of a configuration is shown in drawing 7 .

[0060] the manners directions section 300 The directions information storage section 301, the directions information playback section 302, and the synchronizing section 303 from -- it becomes.

[0061] The following examples explain based on the operation gestalt using a personal computer.

[0062] ** Directions information storage section directions information storage section 301 The behavioral description which includes at least the information which directs predetermined actuation is stored to a registrant. It aims at a registrant giving a certain fixed actuation to a system according to directions in this invention. Actuation here puts changing a bodily condition for the location of the sense of a face, expression, and the body, the location of hand and foot, etc. Moreover, behavioral description puts the contents of directions required in order to have a certain actuation performed.

[0063] The video data (animation) photoed when a certain person performed fixed actuation which exists concretely as behavioral description is sufficient, and actuation can be made to be imitated by showing a registrant-ed this. The video data in that case does not ask an analog and digital one. Since the class of video format is not specified, video can be made into digital video datas, such as AVI and the data of an MOV format which it is digitized and can be reproduced with a personal computer, and MPEG. And it can direct to perform the appointed actuation to a registrant-ed, looking at the animation.

[0064] When behavioral description is constituted from a video data, the index information 3012 which shows the video-data main part 3011 and the contents of video is described by behavioral description. The index information 3012 includes the information for verification of the data explained in the presentation method, the contents of presentation, and the next example etc. Drawing 8 (a) is the example which showed the structure.

[0065] About direction of a face, a certain index is displayed on a screen, and since it can also direct that the method is suitable, actuation of an index etc., description of a display, etc. can be made into behavioral description. In that case, it consists of sequence data 3014 for operating the device name used for a display, a program name 3013, and a program, and index information 3015 showing the contents. Drawing 8 (b) is the example which showed the structure.

[0066] When showing change of expression etc., CG which wore the face the motif may be used. It is made to follow so that the expression of CG may be changed and the same expression formation may be carried out. In this case, behavioral description consists of sequence data 3017 for operating the program name 3016 and program which are used for CG display, and index information 3018 showing the contents. Drawing 8 (c) is the example which showed the structure.

[0067] It stands, and and it can display also about how to sit down. For example, the location data can also be included in behavioral description. Moreover, the symbol which shows actuation may be displayed. In this case, behavioral description consists of sequence data 3020 for operating the device name used for a display, a program name 3019, and a program, and index information 3021 showing the contents. Drawing 8 (b) is the example.

[0068] Here, the example which changes expression, the sense of a face, a posture, etc. is described as a concrete example.

[0069] As an example of a sequence to acquire, as shown in drawing 9 , actuation which returns from amimia expressionlessly via change of a smiling face like drawing 9 (a) - drawing 9 (c) as expression change is performed, and then actuation it turns [actuation] to directions, such as above, down, the right, and the left, as a variation of the sense of a face like drawing 9 (c) - drawing 9 (k) is performed. And next, it is the operating sequence of getting mixed up to a camera as change of a posture like drawing 9 (k) – drawing 9 (l).

[0070] The expression composition by CG is used about the behavioral description which directs change of expression. Since the image generating method by morphing etc. is learned as a general method, linear interpolation of between an expressionless face and smiling faces is carried out, and there is the expression technique of making it change in time etc. What is necessary is just to remember as an example the geometric corresponding-points information, the time interval which deformation takes to be the images of the final state of the expression made into the purpose as a parameter. Here, CG movie which expression was changed serially and created it beforehand is described as a digital video data.

[0071] About the behavioral description which directs change of the face sense, it directs to turn to the direction of the index beforehand displayed on a screen, and display parameters, such as a location of the index and a direction, are described. For example, it expresses that a ball operates with the example to (a) – (q) of drawing 10 , and the location data and rewriting speed are given as a parameter in it. A graphic-display routine is used about a display. A graphic-display routine is the software which can display some graphic forms (a rectangle, a polygon, circle, etc.) on a screen by specifying a location, magnitude, a color, etc.

[0072] About the behavioral description which directs a posture, in order to express getting mixed up toward a screen, like the example of drawing 10 (r) and (s), it considers as symbols list ** and an arrow head is displayed. It makes to make the body get mixed up corresponding to the arrow head into the contents of directions. A display as well as the behavioral description which directs change of the face sense uses a graphic-display routine.

[0073] Moreover, it can be made easy to check by looking by using image generation which projected the body from the back like drawing 11 how he should just actually change the sense of a face. In this case, description by language, such as description of the parameter for compounding CG and VRML, may be used. Furthermore, directions by simple image like drawing 9 used on the occasion of previous explanation may be performed.

[0074] Of course, about these, as stated previously, CG movie compounded using CG etc. may not be used and you may memorize as a digital video data using the image a photograph of was taken on the spot.

[0075] Furthermore, it is much more intelligibly effective by using and directing voice, tone, etc. not only to image information but to coincidence. For example, tone, such as directions of "please be suitable here", "please look at a right index with smile", etc., a buzzer in which it is shown that the contents of presentation are changed, and a chime, etc. can be included as contents of directions. As directions with voice are performing receipt actuation for the contents of portrait directions, for a certain reason, not seeing the screen is also directing with voice and it becomes possible [directing, "to be suitable here" etc.].

[0076] The visual and auditory senses contents of presentation which do not direct actuation of human being as it is, but perform reflecting action and a cultural stimulus of human being are sufficient. The contents which may cause change of expression, such as telling a comic story, as an example may be shown. Moreover, the stimulus which can expect to cause expression change which changes the sense of a face like the image which a ball etc. moves to the left from the right at high speed, or the image with which a ball takes a big step toward a screen, without being conscious, or draws back, cannot change a posture or cannot be expected is sufficient. The variation of various faces will be obtained by these.

[0077] ** Directions information playback section directions information playback section 302 Directions information storage section 301 The stored contents are processed, and it displays and reproduces. The directions information playback section takes a configuration like drawing 13 , and has a playback means to reproduce the contents stored in the directions information storage section 301.

[0078] This example explains using the example which acquires the sequence expressed to previous drawing 9 . The example which used the personal computer as an operation gestalt is described. In order to direct change of expression, it memorizes as digital data and reproduces as a digital video by the playback section. The playback section is expressed by the decoder software 3201 which decodes a video data here, and the decoded output is sent to the output section.

[0079] Next, about direction of a face, as shown in drawing 10 (a) – (q), it directs by motion of a ball. The time interval of a display of a ball, a location, etc. are displayed in accordance with the contents stored in the directions information storage section, and a motion is realized by changing the location of a ball in time. It realizes by the graphic–display routine 3202, and the playback section is the directions information output section 400. The result is sent.

[0080] About directions of a posture, as shown at drawing 10 (r) and (s), a symbol is displayed. The graphic–display routine 3202 is used for the display of a symbol as well as [as the playback section] a ball display. Here, in order to change the sense of an arrow head, some kinds are displayed with a certain time interval, and it is sent to a display.

[0081] Voice and tone may be used as stated previously. Therefore, when it directs with voice or the class of contents of directions is changed using the voice output function of a personal computer, you may perform making tone etc. The audio decoder

3203 is used for the playback section in that case.

[0082] ** Synchronizing section synchronizing section 303 It has the device in which timing, such as initiation, a halt, and speed adjustment, is adjusted for presenting of directions information. Moreover, control of image collection of registration equipment can also be performed.

[0083] Synchronizing section 303 As shown in drawing 12 as an example, it consists of the synchronizing signal receipt section 3301, the control signal output section 3302, and the control mediation section 3303.

[0084] The synchronizing signal receipt section 3301 is connected with each of other means, and receives signals, such as various kinds of parameters for initiation of actuation of each means, termination, and control.

[0085] Like the synchronizing signal receipt section 3301, the control signal output section 3302 is connected with each of other means, and transmits various kinds of parameters which opt for initiation of operation, termination, and actuation of each means to each means.

[0086] The control mediation section 3303 specifies actuation of other means according to the set-up actuation. In the control mediation section 3303, it is set up so that scheduling like drawing 16 may be performed, a carrier beam signal is judged from the synchronizing signal receipt section 3301, according to the set-up actuation, it lets the control signal output section 3302 pass to other means, and a control signal is transmitted.

[0087] Synchronizing section 303 It is possible to prevent presentation of a directions display and the time lag of collection of image information. For example, since some time amount is needed in order for human being to actually change the sense of a face as perception in presentation of a dynamic image, amendment of the time amount etc. can be performed and images can be collected.

[0088] (4) Directions information output section directions information output section 400 It is display 300, i.e., the manners directions section, about the contents of a display for directing to human being. The signal taken out from the playback section is displayed, pronounced and uttered.

[0089] it is shown in drawing 14 -- as -- as a component -- the I/O Monitoring Department 401, a display 410, a loudspeaker 420, a lamp 430, and buzzer 440 etc. -- it is mentioned. Directions information output section 400 The information sent responds to the media and, for image information, a display 410 and speech information are a loudspeaker 420. It is sent. moreover, lamp 430 Buzzer 440 etc. -- it may arrange and you may use suitably. the I/O Monitoring Department 401 The directions information output section 400 from -- while sending a signal to each device, initiation of a signal input and detection of termination also perform the sent input. Such information is used in the another example.

[0090] Moreover, the image input section 100 It is the directions information output section 400 about the face image under registration obtained by leading. Outputting is possible. In this case, in order that not only the image processing of carrying out mirror plane reversal and displaying a face image but a candidate person may tell that recognition processing is carried out exactly, in order to tell a person about the rectangle display of the face field as a detection result, and the detection location of face components, symbols list **, such as marking of face components, may be performed to coincidence like drawing 15 .

[0091] The person authentication equipment which inputs a face image and performs person authentication about the whole actuation in the configuration of <of operation example 1> drawing 1 is explained as an example. The contents of registration are the face image data and dictionary for personal authentication. It sets for the concrete example of registration, and is the synchronizing section 303. It considers as a center and actuation of each part is explained using drawing 16 .

[0092] The downward arrow head of drawing 16 expresses the direction of time amount, and the arrow head of the width between Downarrow expresses delivery of the signal for taking a synchronization, or various kinds of parameters.

[0093] Drawing 17 is the flow chart of actuation of the whole system. In case a person is newly registered, it is the face image registration section 200 first. Face field detecting element 201 It waits to set and to detect a face (step 7001). the synchronizing section 303 it sets up so that scheduling of drawing 16 may be performed -- having -- **** -- face field detecting element 201 from -- if a signal is received, the signal of the output of the contents of directions will be transmitted to the contents are recording section of directions (signal 7101). The contents of directions are considered as a screen configuration like drawing 10 . The contents are recording section of directions outputs delivery and the contents of directions for the contents of directions to the contents playback section of directions (step 7002). The contents output section of directions receives a signal 7102, and outputs the contents of directions (step 7003).

[0094] Face image registration section 200 Face images are collected while the contents of directions are outputted (step 7004). A person performs actuation as shown by drawing 9 , looking at the contents of directions. The contents output section of directions is the synchronizing section 303 about some contents of directions about the signal 7103 of contents output initiation, and the signal 7104 of contents termination initiation. It transmits and is the face image registration section 200 by the signal 7105 at the time of initiation of the output of the whole contents of directions, and termination. The signal of initiation of registration and termination is given.

[0095] It judges whether the whole contents of directions are completed (step 7005), and, as for a certain case, the contents of directions still continue the output of the contents of directions, and collection of a face image. When the whole contents of directions are completed, face image collection is ended and the dictionary which is the contents of registration is generated (step 7006). After a dictionary is generated, the contents of new registration are added in renewal of the data base of the contents storage section of registration, and this case (step 7007).

[0096] <Operation gestalt 2> The thing of drawing 20 is described as another operation gestalt. The external information input section 500 which has the condition of individual humanity news or human being, and a means to acquire the input of the synchronizing signal from the system outside etc. further, in drawing 20 It has. In addition, at drawing 20 , it is the external information input section 500. It is called ID acquisition section.

[0097] (5) External information input section external information input section 500 Information, such as a check input from the incidental information, the code, and the system outside for identifying registration information, is acquired. Specifically, incidental information shows the information about individuals, such as a code number corresponding to a registrant, a name, age, and sex. The code showing the condition of human being feeling and which directions to see furthermore can also be inputted. [, such as joy, anger, humor and pathos,] Moreover, it is used also for the input of a signal required for various kinds of interactive system behavior, such as the synchronizing signal from the outside, for example, initiation of registration, and a check of the contents of registration.

[0098] the incidental information reading section 510 A keyboard 511, ID card equipment 512, radio equipment 513, a mouse 514, and carbon button 515 etc. -- one or two or more combination of equipment realize.

[0099] It is a keyboard 511 in order that human being may input the code number and name corresponding to a registrant as an example. ID card equipment 512 which it can use and can read the existing ID cards, such as a personnel certificate, Reading the information written to the card as incidental information, and using it is mentioned. moreover, radio equipment 513 etc. -- reading ID **** -- mouse 514 The contents of selection which used and were displayed on the screen can be chosen. The contents of selection here are ID for authentication, the icon showing feeling of language, an icon that shows the direction currently seen. moreover, carbon button 515 for performing the check of the contents of presentation, and the directions to a system etc. -- it can use.

[0100] ID issue section 520 The serial number etc. is published for the incidental information which should be registered, and it outputs with incidental information. Or signal transformation of the input data for interactive actuation is also performed.

[0101] First, an example is explained about the case of authentication equipment. Incidental information reading section 510 It is the face image registration section 200 about the individual humanity news into which a name, age, an ID number, sex, etc. were inputted. The serial number for managing is attached and it outputs.

[0102] Next, the case of expression recognition or look detection is explained. First, about the case of look detection equipment, it is directing the direction of a look, and the sense of a face by specifying the sense of the left, the right, etc. with a mouse a top and the bottom etc., and the serial number or the information on a location is added, and it is outputted.

[0103] Moreover, about the case of expression recognition equipment, directions of the carbon button which expression, such as "**", "**", "pity", and "comfort", expresses output the number corresponding to the expression. Moreover, change of expression takes place in time and it is possible that fluctuation occurs in an in-between change (halfway expression from a certain expression to a certain expression) depending on the change sequence of the expression. Then, ComicChat (David Kurlander, Tim Skellyu, David Sales, ComicChat, SIGGRAPH'96, pp.225-236, 1996) Emotion wheel of drawing 19 which is used Human being is made to notify description how to change expression, using an interface [a style], and the sequence of the fluctuation locus is outputted as behavioral description.

[0104] Drawing 19 (a) is Emotion wheel. It is an interface [a style], and if there is an icon which expresses change of expression in some directions and a cross joint is moved in a certain direction to a center being expressionless, the magnitude and the class of expression can be chosen. At drawing 19 (b) and (c), using the interface, the change locus of expression is shown, by (b), it becomes expressionless from a certain expression, and will change to another expression, and the locus which changes to all expression will be expressed with (c).

[0105] In this case, the manners directions section 300 The contents of directions change by composing composition of the expression by CG, or the playback sequence of the sequence of video of having stored expression, corresponding to that fluctuation locus then. The contents of directions according to this will be shown, and a face image will be registered.

[0106] Thus, in order to specify a person's contents of action for person itself, the external information input section 500 can also be used, and about the gestalt, it does not restrict to this example.

[0107] Moreover, as an example using the input section as an input of interactive actuation, initiation is directed to the contents of directions "whether registration is started" using a keyboard, a mouse, a carbon button, etc. Or when there are two or more classes of contents of directions for registration, a check is urged for every directions of operation, and directions, the check of the contents, etc. are started using a keyboard, a mouse, a carbon button, etc.

[0108] <Of operation example 2> external information input section 500 The example of the used system of operation is explained. Drawing 21 is the flow chart of actuation of the whole system.

[0109] First, the external information input section 500 It sets and the name which is incidental information, an ID number, age, etc. are inputted from a keyboard (step 7201). if the same actuation as flow chart drawing 17 of the previous example 1 of operation is fundamentally performed after an input is completed (step group 7202), and collection is completed -- ID issue section 502 from -- the name which is incidental information, an ID number, age, etc. are transmitted to the registration information storage section (step 7203), and it is added with the drawn-up dictionary (step 7204).

[0110] Moreover, the synchronizing section 303 Scheduling of drawing 22 is performed. a signal 7301 -- the external information input section 500 from -- if that the input of incidental information was completed receives, initiation of the output of the contents of directions will be directed and collection of a face image will be started. and the output of the contents of directions -- ending -- registration of a face image -- termination -- a signal 7302 -- the synchronizing section 303 rank next -- ****** and the external information input section 500 from -- transmission of incidental information -- directing (signal 7303) -- the external information input section 500 from -- incidental information -- the face image registration section 200 It transmits (signal 7304). After registration is completed, it is the synchronizing section 303. The signal of termination is sent and a series of processings are completed (signal 7305).

[0111] <Of operation example 3> external information input section 500 Another example of the used system of operation is explained. External information input section 500 It is used also as an input means of the dialogue input not only for the incidental information on ID but interactive system behavior, and the example is shown.

[0112] Drawing 23 is the flow chart of actuation of the whole system. A system is posture directions (r) of face sense (a) - (q) in two or more contents of directions, for example, drawing 10 , and the relative position from a screen, and (s). In the case of different contents [like] of directions, an acknowledge request is performed to each directions.

[0113] First, the external information input section 500 It sets and the name which is incidental information, an ID number, age, etc. are inputted from a keyboard (step 401).

The contents of the acknowledge request are displayed that an input is completed. for example, -- "-- from now on, please change the sense of a face. If ready, please press one key of the keyboards. The demand " is shown (step 7402).

[0114] If the input of a key is inputted into waiting (step 7403) and a key by the loop of an acknowledge request, it will output by reproducing the contents of directions (steps 7404 and 7405). And face images are collected to coincidence (step 7406). It judges whether the one contents of directions were outputted (step 7407), and if it has not ended, image collection is continued further. If it has ended, it will judge whether next all the contents of directions were outputted (step 7408). If two or more contents of directions are not completed yet when another contents of directions exist, it progresses to a new acknowledge request. If all the contents of directions are completed, generation of a dictionary and registration will be performed (steps 7409, 7410, and 7411).

[0115] Moreover, the synchronizing section 303 Scheduling of drawing 24 is performed. Drawing 24 is illustrating about the synchronousr control of one certain contents of directions in the scheduling of two or more contents of directions. a signal 7501 -- the external information input section 500 from -- reception of that the input of incidental information was completed transmits the acknowledge request (signal 7502) of the contents of directions. External information input section 500 A check result will be transmitted if there are waiting (processing 7503) and an input about the check of a key input (signal 7504). If directions of initiation are transmitted to the contents are recording section of directions after that (signal 7505), the contents are recording section of directions will output delivery (signal 7505) and the contents of directions for the contents of directions to the contents playback section of directions.

[0116] The contents output section of directions is the synchronizing section 303 about the signal 7506 of contents output initiation. It transmits and is the face image registration section 200 by the signal 7507. Initiation of image collection is told. The contents output section of the directions after continuing collection of an image is the synchronizing section 303 about the signal 7508 of contents output termination. It transmits and is the face image registration section 200 by the signal 7509. Directions of termination of image collection are transmitted. Face image registration section 200 Termination of image collection is told with a signal 7510. Synchronizing section 303 The acknowledge request of the following contents of directions is performed like a front (signal 7511). The rest processes other contents of directions similarly (the signal 7512 or subsequent ones).

[0117] <Operation gestalt 3> The thing of drawing 25 is described as another operation gestalt. The contents verification section 600 of registration which verifies [whether the data acquisition which suited after a collection process or collection termination is made of drawing 25 , and] the contents of registration It has. In addition, at drawing 25 , it is the external information input section 500. It is called ID acquisition section.

[0118] (6) The contents verification section 600 of the contents verification section registration of registration Acquisition data is verified [whether registration data fulfills the contents as a demand, or sufficient varieties have been collected, and], and it confirms. as one example of a configuration -- drawing 26 -- like -- the contents verification section 600 of registration The contents receipt section 601 of directions, and the data verification section 602 from -- it becomes.

[0119] the contents receipt section 601 of directions The directions information storage section 301 from -- it interprets what kind of directions [reception and] were performed in the contents of directions, the decision criterion and performance index for data verification which suited the contents are chosen, and it sends to the data verification section.

[0120] the data verification section 602 The contents receipt section 601 of directions from -- based on the decision criterion and performance index which were received, it verifies whether the input data fulfills the decision criterion and the performance index, and the result is outputted.

[0121] Like drawing 26 , it is the data verification section 620. It has the face sense recognition means 6201, the expression recognition means 6202, the posture recognition means 6203, and the image fluctuation recognition means 6204, and the result is held to the verification result Records Department 6205.

[0122] each means -- the image input section 100 from -- or it inputs an image -- or the face image registration section 200 it was processed -- on the way -- a result and the started processing result, a detection parameter, etc. are received as an input. each means -- the image and the contents receipt section 601 of directions from -- the score of whether the data acquired based on the received error criterion conforms to criteria is calculated, and it sends to the verification result Records Department 6205.

[0123] In the case of the contents of "wearing a face upward", as an example, the contents receipt section of directions sends the performance index about "facing up" to a face sense recognition means as contents of directions. Suppose that a face sense recognition means is asked for the similarity according the extracted image to reception template matching, and let a performance index be a function showing a "facing-up" template. A face sense recognition means asks for similarity, and sends it to the verification result Records Department. At the verification result Records Department, it judges by whether it is over the threshold over the set-up similarity.

[0124] Moreover, it may not judge in details about the contents of directions according to an individual, but may verify whether variety is fully obtained. In this case, the method of comparing distribution of each pixel value can be considered about the collected data. The image fluctuation recognition means 6204 detects the degree of dispersion in this data. Since the expression of a face etc. has much fluctuation of the cheek and eye circumference, it calculates distribution of the pixel value corresponding to those locations. If the value more than [which has been compared with the variance in the case of having turned to the transverse plane] fixed can be taken by the attention pixel, it will be judged that variety is obtained.

[0125] Furthermore, with the image fluctuation recognition means 6204, in order to verify actuation, when it asks for the optical flow in an image and the direction of a motion judges whether it is the right, how to verify is explained. When its attention is paid to this method about the edge component for which face components etc. make the sense of a face when changing in another direction from a certain direction (the right sense to facing the left etc.), a motion vector is observed along that direction. In this case, that vector information is accumulated and the decision of not using of the data acquired with the frame as which change is seldom regarded is attained.

[0126] The contents verification section 600 of the <of operation example 4> registration The example which collects after collection of an image and verifies data as a used example is described.

[0127] By the same explanation method as an old example of operation, scheduling is explained as drawing 27 . In this example, one certain contents of directions are shown and the image obtained as a result is verified.

[0128] Synchronizing section 303 To the contents are recording section of directions, a signal 7601 is transmitted so that the contents of directions may be transmitted. The contents are recording section of directions reproduces the contents of directions, and transmits to the contents output section of directions (signal 7602). Furthermore, the contents are recording section of directions is the contents verification section 600 of registration. The contents of directions are transmitted (signal 7603) and it is the contents verification section 600 of registration. The information is held. Next, the synchronizing section 303 When the output start signal (signal 7604) from the contents output section of directions is received, it is the face image registration section 200. Collection initiation of a face image is directed (signal 7605). When directions (signal 7606) of termination are sent from the contents output section of directions, it is the face image registration section 200. Collection termination of a face image is directed (signal 7607). the face image registration section 200 the face image which notifies collection termination of a face image to the synchronizing section 303, simultaneously (signal 7608) collected it -- the contents verification section 600 of registration It sends (signal 7609). The contents verification section 600 of registration The collected face images are held and verification is started by the notice (signal 7610) from the synchronizing section 303. And it is the synchronizing section 303 about a verification result. It notifies (signal 7611).

[0129] Synchronizing section 303 It is possible to judge whether it collects again, as a result of [the] receiving.

[0130] <Example 5 of operation> The example which verifies to image collection and coincidence is described using the verification function mentioned above. This actuation becomes like drawing 28 in scheduling.

[0131] Synchronizing section 303 To the contents are recording section of directions, a signal 7701 is transmitted so that the contents of directions may be transmitted. The contents are recording section of directions reproduces the contents of directions, and transmits to the contents output section of directions (signal 7702). Furthermore, the contents are recording section of directions is the contents verification section 600 of registration. The contents of directions are transmitted (signal 7703) and it is the contents verification section 600 of registration. The information is held. Next, the synchronizing section 303 When the output start signal (signal 7704) from the contents output section of directions is received, it is the face image registration section 200. Collection initiation of a face image is directed (signal 7705). To coincidence, it is the contents verification section 600 of registration. It also receives and verification initiation is directed (signal 7706).

[0132] The contents verification section 600 of registration About a verification result, it is the synchronizing section 303. When it receives, it transmits at any time (signal 7707) and the data to need is obtained, it is the face image registration section 200. A halt of collection of a face image is directed (signal 7708). Moreover, another contents of directions are shown (signal 7709), and it is the face image registration section 200 again. Collection of a face image is made to resume (signal 7710).

[0133] Similarly, when some contents of directions are shown, it is the synchronizing section 303. Face image registration section 200 Collection termination is notified (signal 7711) and it is the face image registration section 200. It is the synchronizing section 303 about collection of a face image having been completed. It notifies (signal 7712).

[0134] This example of operation is used and it is the contents verification section 600 of registration. The contents of directions can also be changed verifying then. What is necessary is just to change the contents of directions in drawing 28 in the place of a signal 7710 based on a verification result. It can process making it the contents of directions again same when the data of the target direction and a different direction is collected as the case where there is little collection number of sheets, or a verification result, or changing into the another presentation method by image recognition going wrong as a collection result, when face image collection when directing to turn a face in a certain direction if it is an example and having turned to the direction is performed etc.

[0135] A <modification> modification is described.

[0136] Face image registration section 200 The means relevant to the characteristic quantity extract of a face field detecting element, a face components detecting element, the characteristic quantity extract section, etc. is incorporated as some recognition equipments, and those components may be used when the means for calculating the same characteristic quantity is equipped.

[0137] Another various things may be used for characteristic quantity required [although the image feature based on a shade was used by this example as characteristic quantity for recognition] in order to recognize a person's individual human nature, a condition, etc.

[0138] Although this example explained centering on individual recognition equipment, it may be applied to other person recognition equipments, for example, expression recognition equipment, look detection equipment, lips recognition equipment, etc.

[0139] As mentioned above, in the range which does not deviate from the meaning, it deforms variously and this invention can be carried out.

[0140] In addition, the program for performing the above-mentioned activity is created, this may be stored in record media, such as FD, CD-ROM, and MO, it may be made to install on the hard disk of a personal computer, and this invention may be carried out. Moreover, the hard disk which installed the above-mentioned program is also contained in a record medium.

[0141]

[Effect of the Invention] According to this invention, the face image which contained variety efficiently can be obtained, for example, a great effect is brought to improvement in the recognition rate in face recognition equipments, such as person authentication equipment, expression recognition equipment, look detection equipment, and lips recognition equipment.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the configuration of the equipment of the 1st operation gestalt.

[Drawing 2] It is drawing showing the example of 1 configuration of the image input section.

[Drawing 3] It is drawing showing the example of 1 configuration of the face image registration section.

[Drawing 4] It is explanatory drawing of how to cut down a face image.

[Drawing 5] It is drawing showing the example of a feature-vector image.

[Drawing 6] It is the operation flow chart of the face image registration section.

[Drawing 7] It is drawing showing the example of 1 configuration of the manners directions section.

[Drawing 8] It is explanatory drawing of the structure of behavioral description.

[Drawing 9] It is explanatory drawing of the example of acquisition C KANSU.

[Drawing 10] It is drawing of the example of presentation of an index.

[Drawing 11] It is drawing of the example of presentation using CG from a person's back.

[Drawing 12] It is drawing showing the example of 1 configuration of the synchronizing section.

[Drawing 13] It is drawing showing the example of 1 configuration of the directions information playback section.

[Drawing 14] It is drawing showing the example of 1 configuration of the directions information output section.

[Drawing 15] It is drawing of an example of marking of a result.

[Drawing 16] It is drawing of the example of synchronous scheduling.

[Drawing 17] It is the flow chart of whole actuation of the example 1 of operation.

[Drawing 18] It is drawing showing the example of 1 configuration of the external information input section.

[Drawing 19] It is explanatory drawing of the example of expression change routing.

[Drawing 20] It is drawing showing the configuration of the equipment of the 2nd operation gestalt.

[Drawing 21] It is the flow chart of whole actuation of the example 2 of operation.

[Drawing 22] It is drawing of the example of ID input scheduling.

[Drawing 23] It is the flow chart of whole actuation of the example 3 of operation.

[Drawing 24] It is drawing of the example of input check scheduling.

[Drawing 25] It is drawing showing the configuration of the equipment of the 3rd operation gestalt.

[Drawing 26] It is drawing showing the example of 1 configuration of the contents verification section of registration.

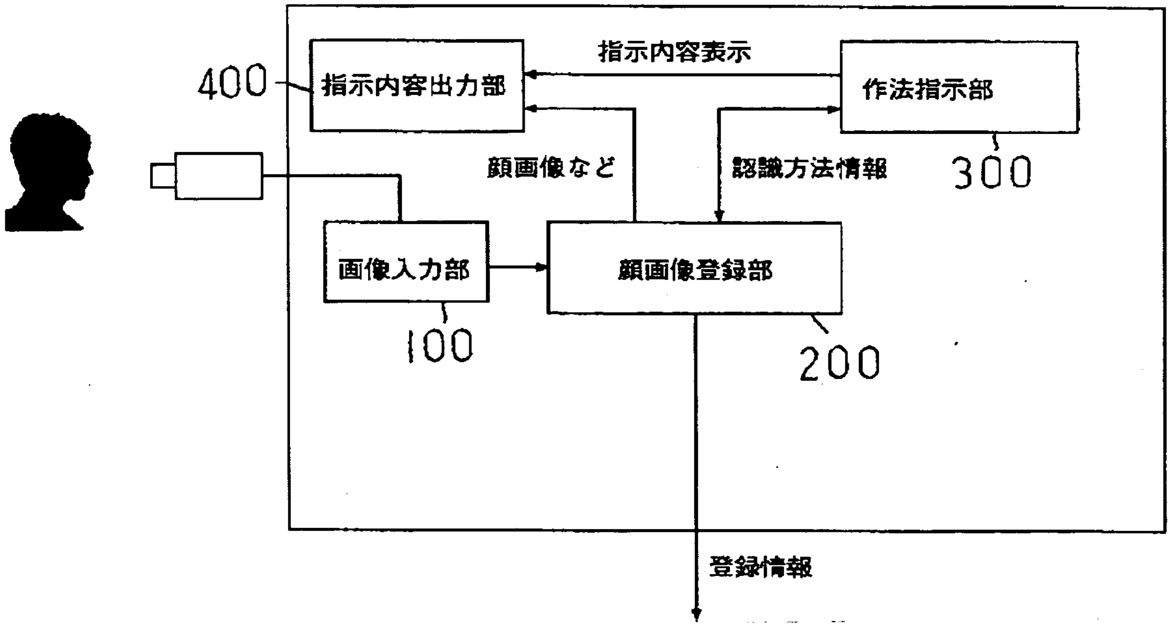
[Drawing 27] It is drawing of the example of synchronous verification scheduling.

[Drawing 28] It is drawing of the example of registration synchronous verification scheduling.

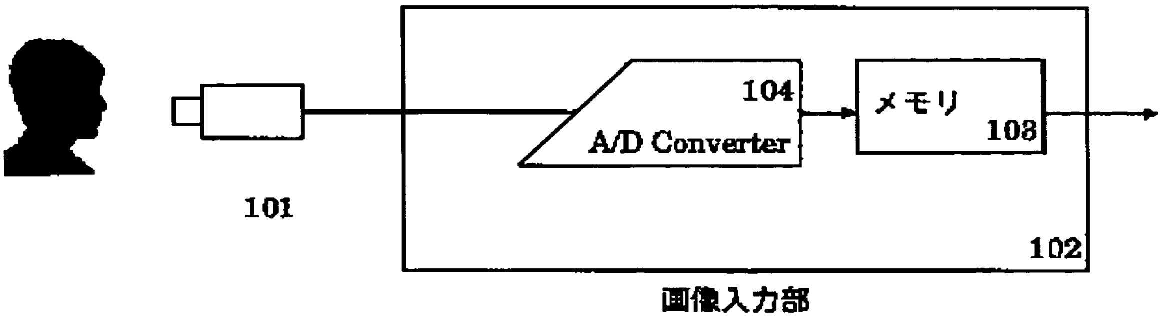
[Description of Notations]

100 Image Input Section
200 Face Image Registration Section
300 Manners Directions Section
400 The Contents Output Section of Directions
500 External Information Input Section
600 The Contents Verification Section of Registration

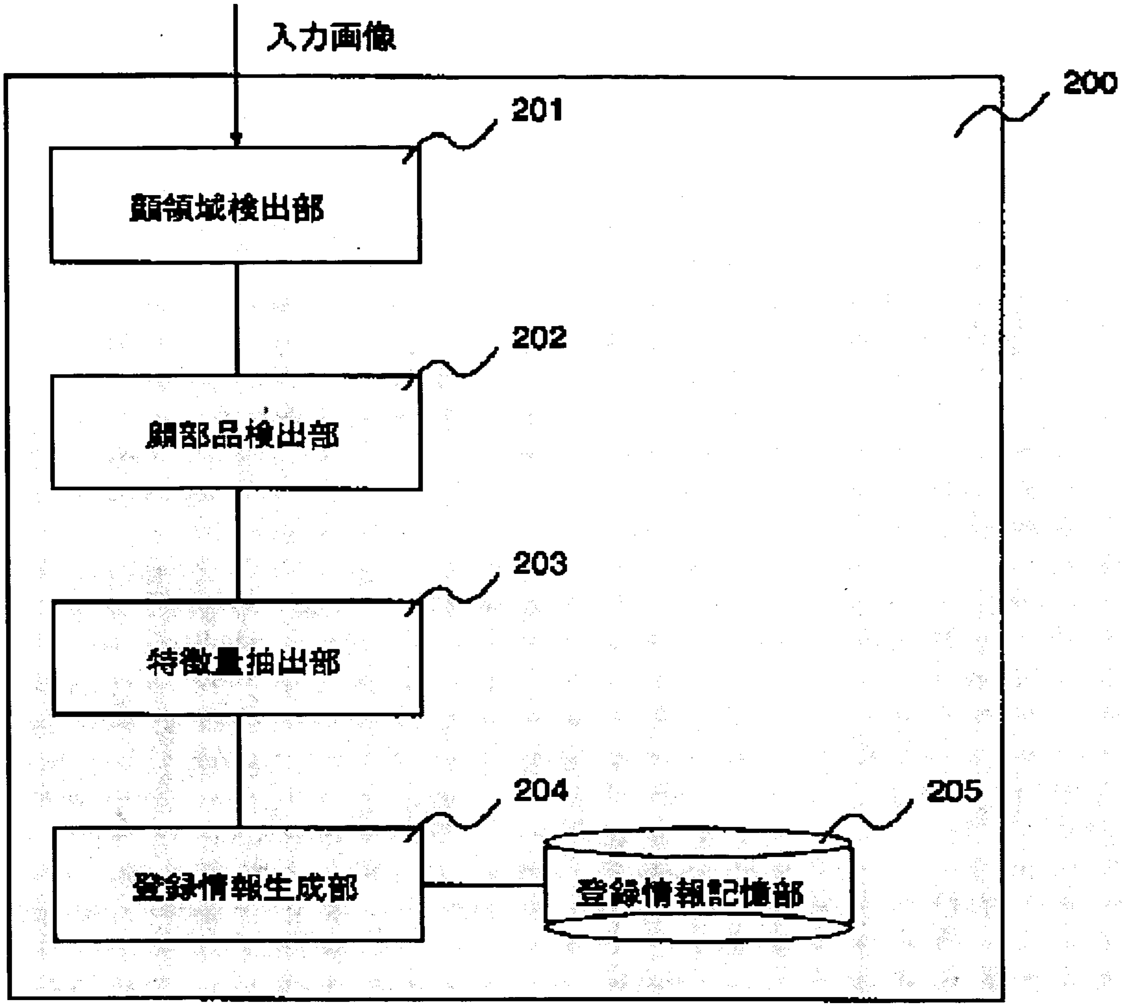
[Drawing 1]


400
指示内容出力部
指示内容表示
作法指示部
顔画像など
認識方法情報
300
画像入力部
顔画像登録部
100
200
登録情報

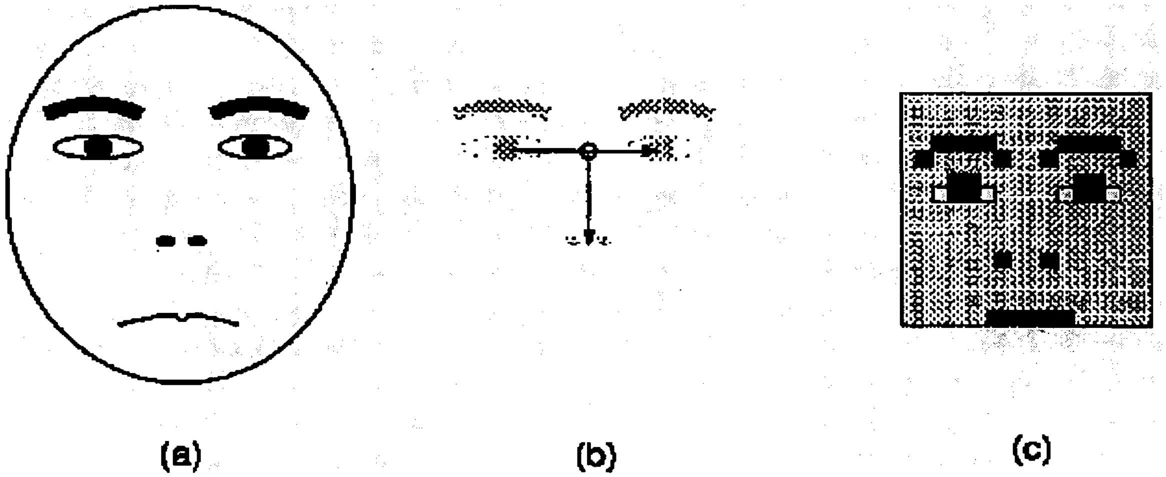
[Drawing 2]


104
A/D Converter
メモリ
108
101
102
画像入力部

[Drawing 3]

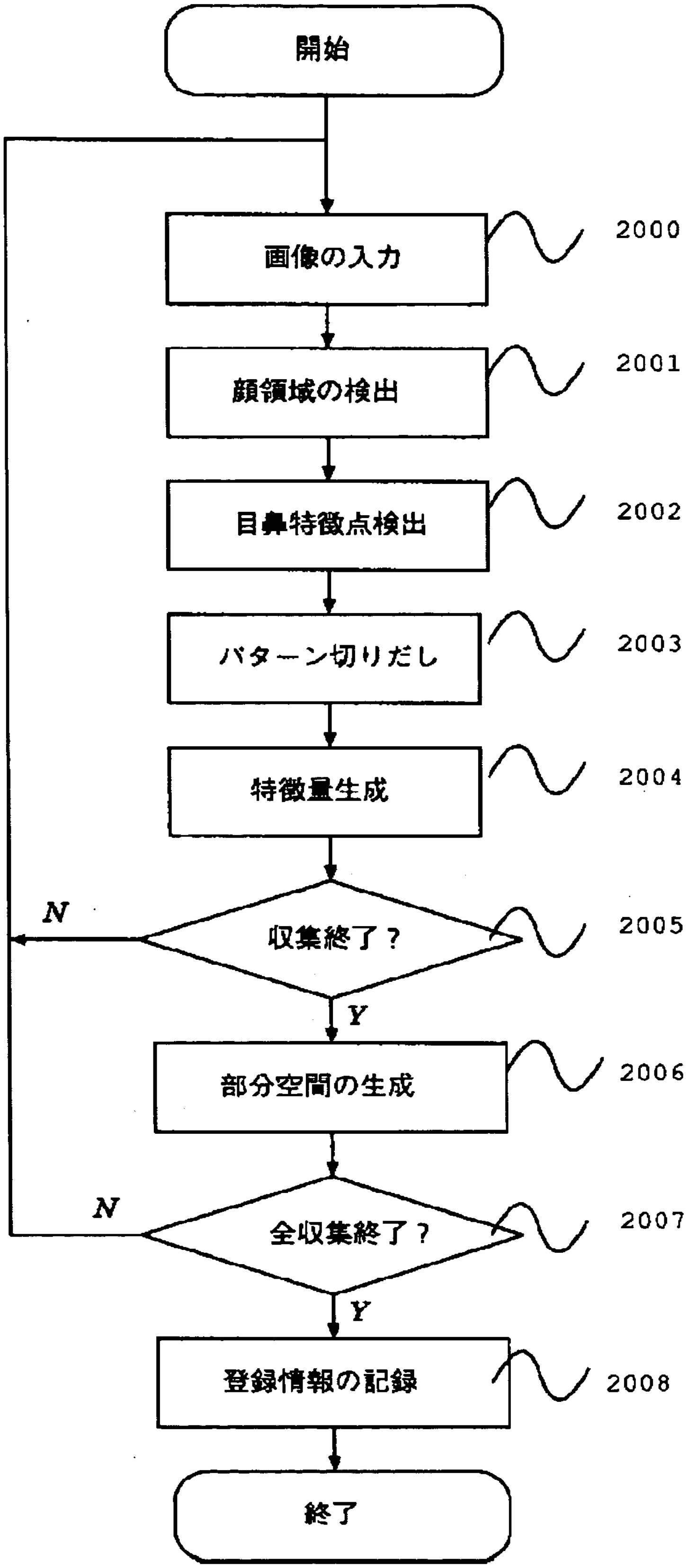

入力画像
200
201
顔領域検出部
202
顔部品検出部
203
特徴量抽出部
204
登録情報生成部
205
登録情報記憶部

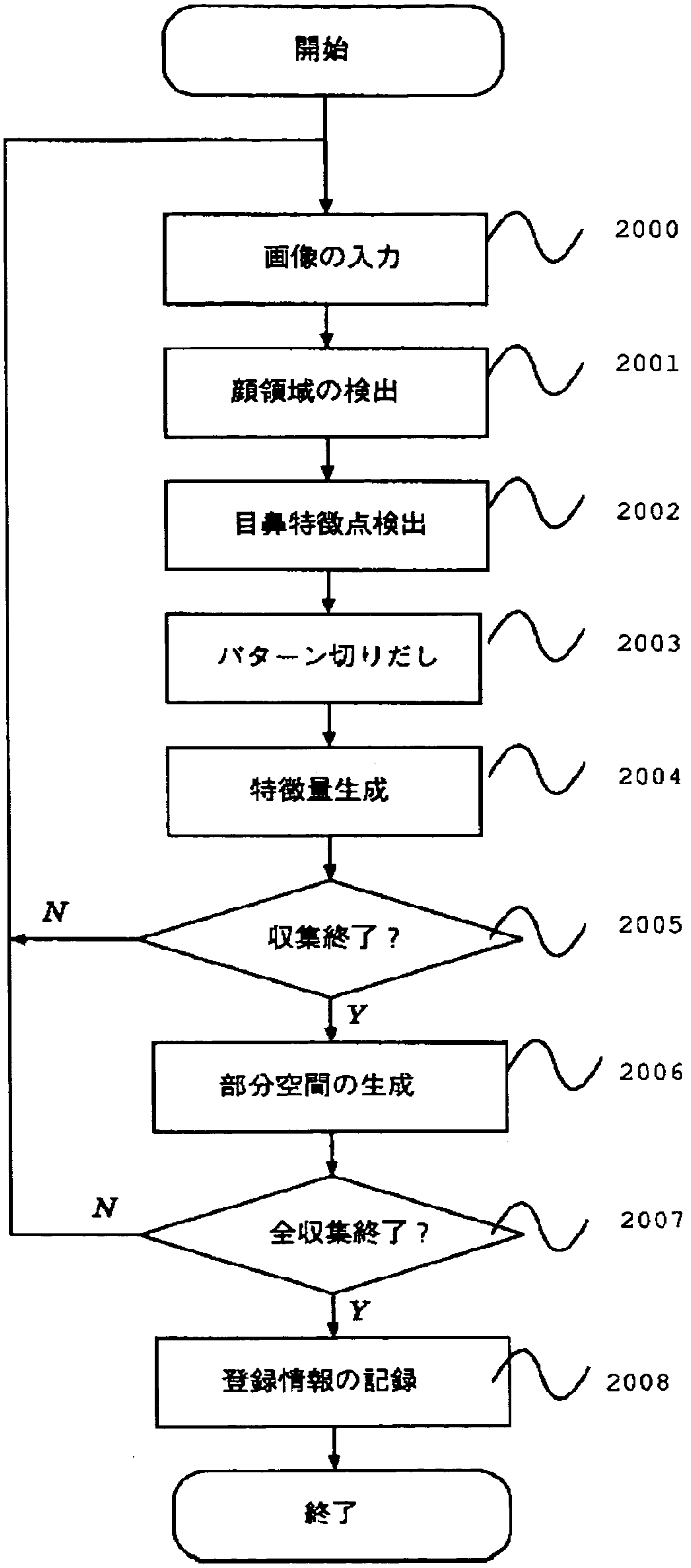
[Drawing 4]



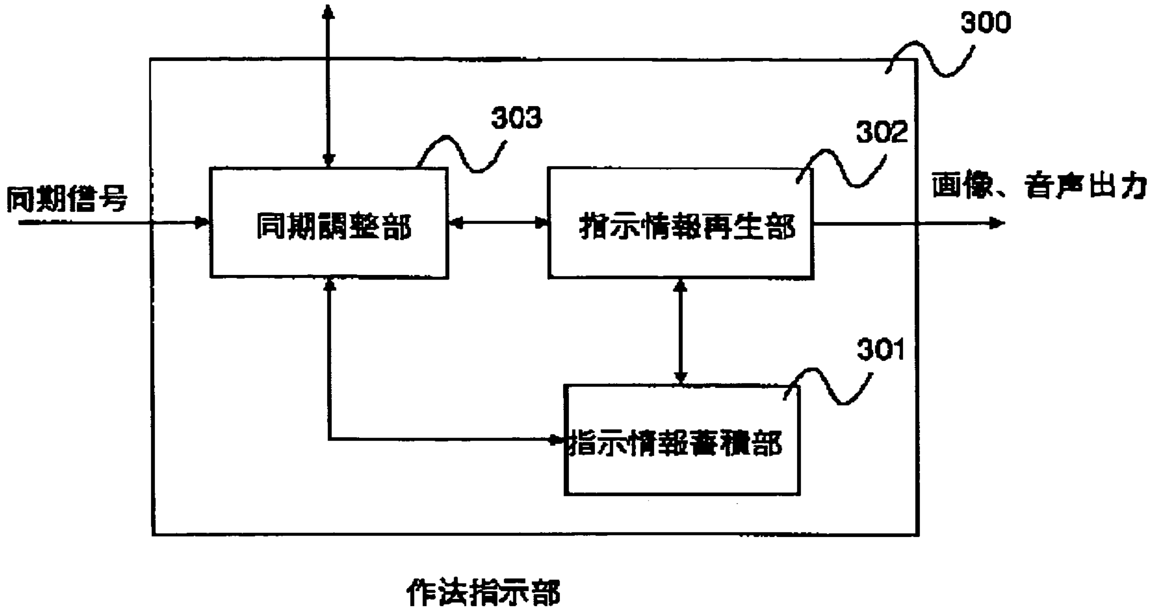
[Drawing 5]

[Drawing 6]

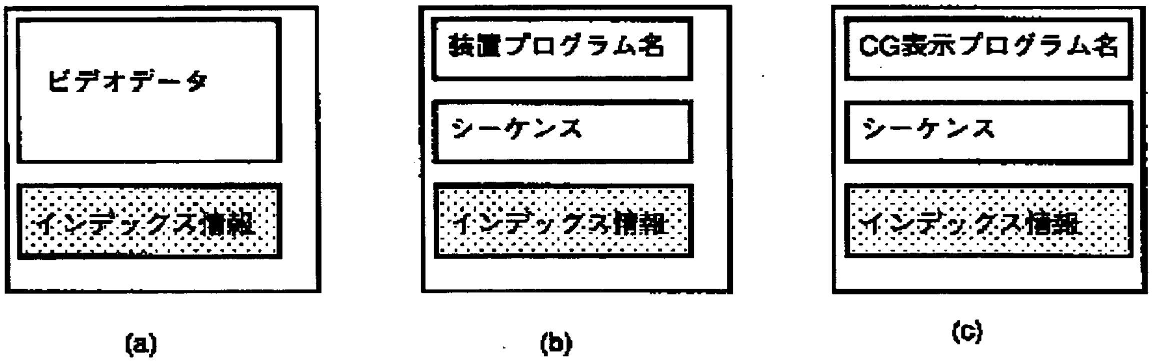

開始
画像の入力
2000
顔領域の検出
2001
目鼻特徴点検出
2002
パターン切りだし
2003
特徴量生成
2004
収集終了？
N
Y
2005
部分空間の生成
2006
全収集終了？
N
Y
2007
登録情報の記録
2008
終了


開始
画像の入力
2000
顔領域の検出
2001
目鼻特徴点検出
2002
パターン切りだし
2003
特徴量生成
2004
収集終了？
2005
N
Y
部分空間の生成
2006
全収集終了？
2007
N
Y
登録情報の記録
2008
終了

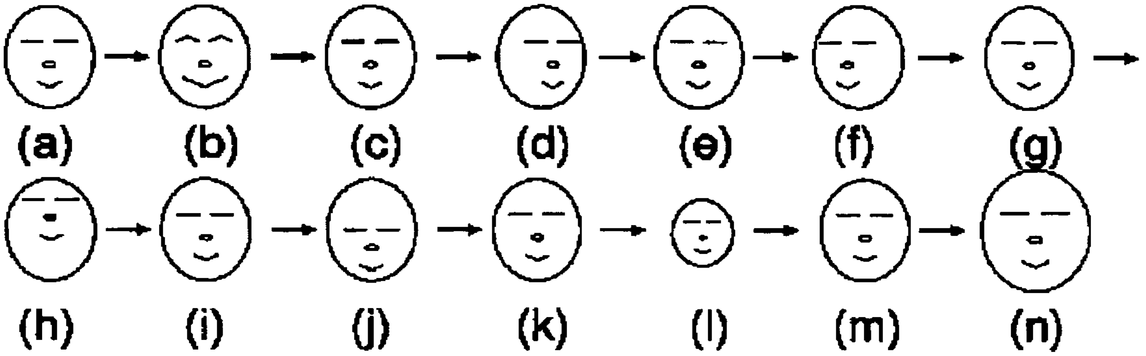
[Drawing 7]


300
303
302
301
同期信号
同期調整部
指示情報再生部
画像、音声出力
指示情報蓄積部
作法指示部

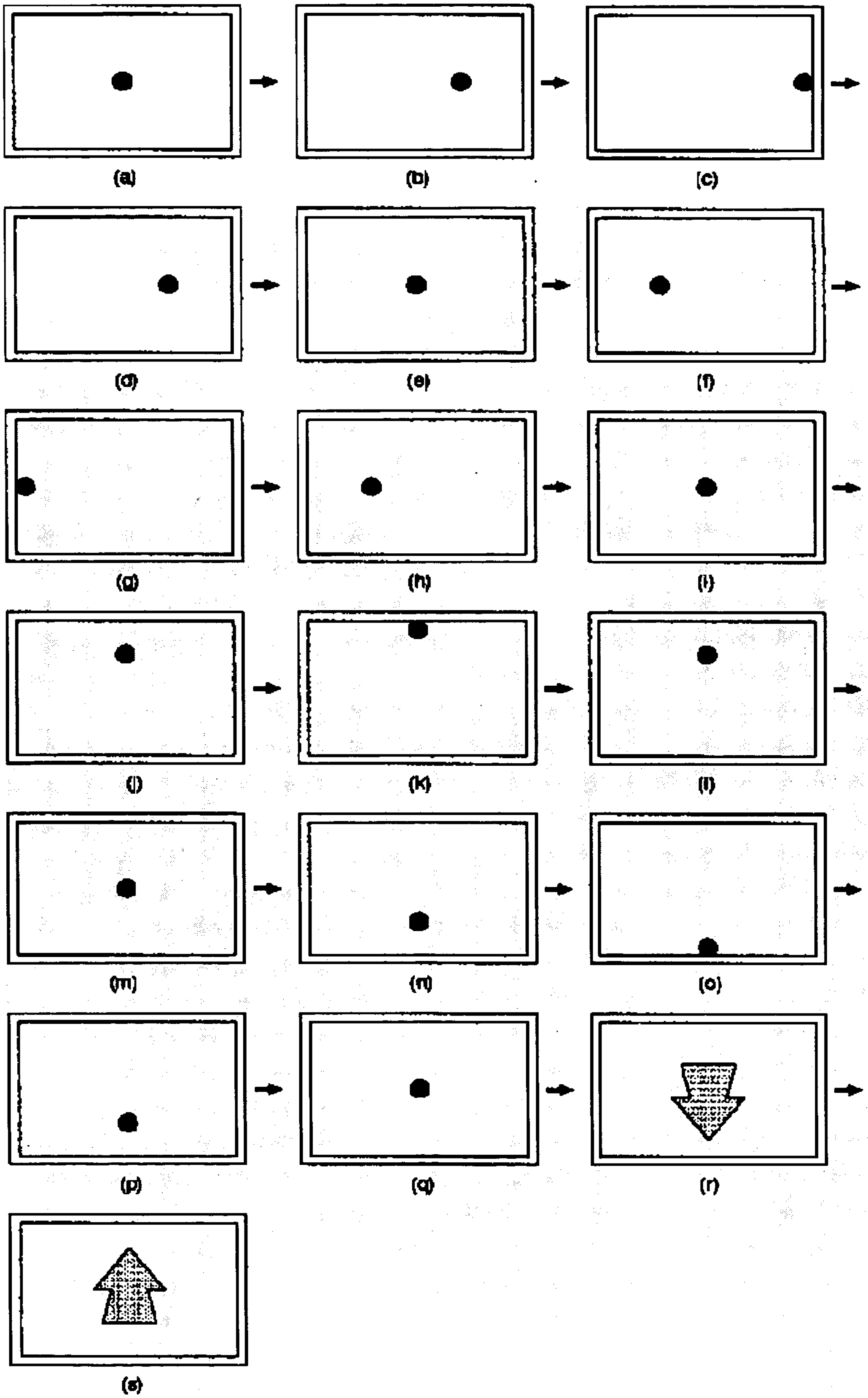
[Drawing 8]


ビデオデータ
インデックス情報
装置プログラム名
シーケンス
インデックス情報
CG表示プログラム名
シーケンス
インデックス情報
(a)
(b)
(c)

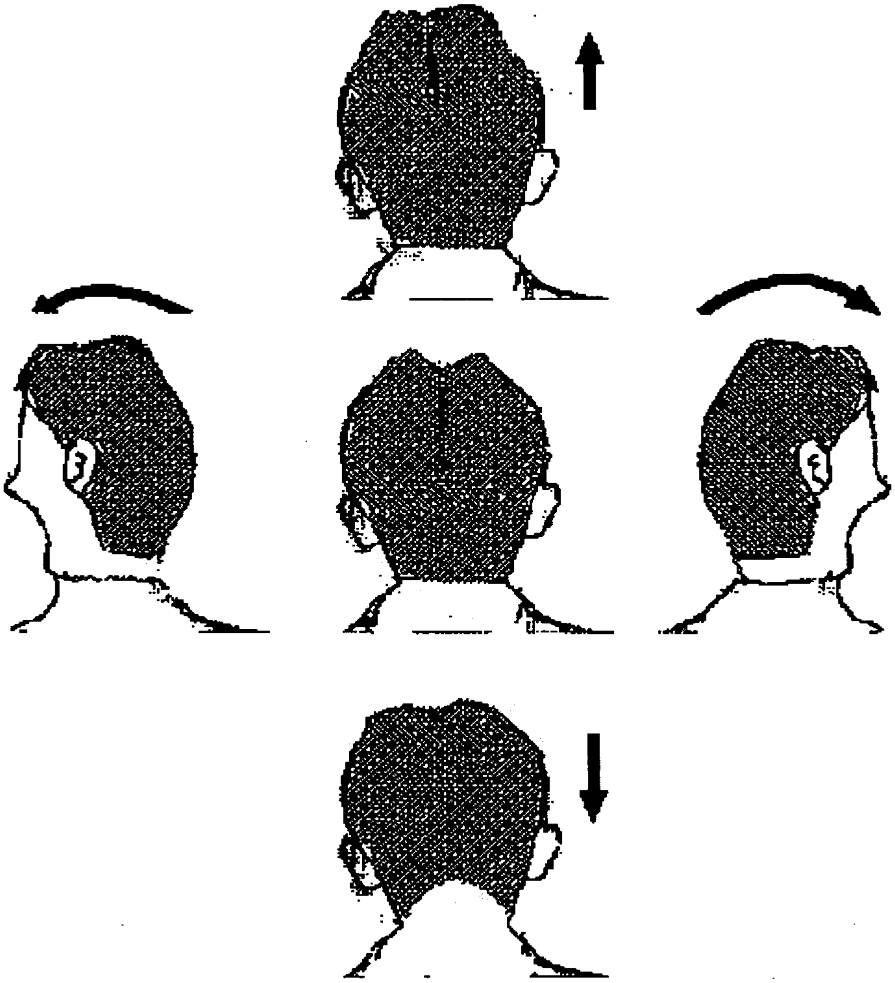
[Drawing 9]


(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)
(i)
(j)
(k)
(l)
(m)
(n)

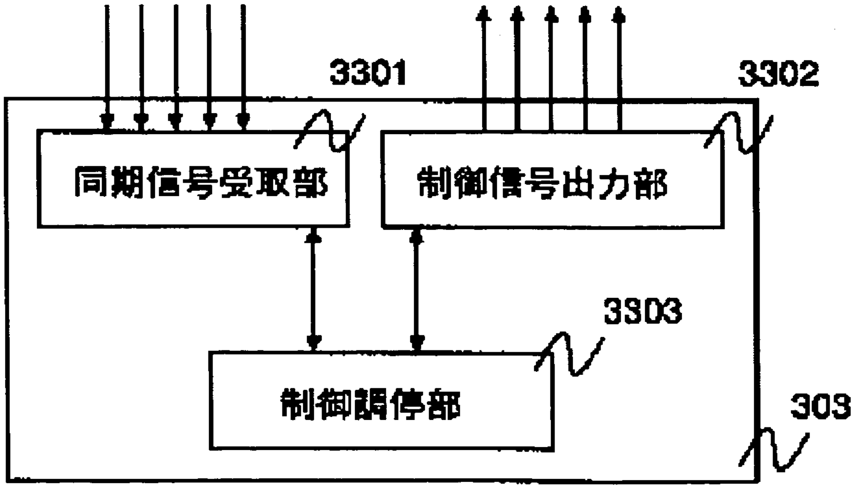
[Drawing 10]


(a)
(b)
(c)
(d)
(e)
(f)
(g)
(h)
(i)
(j)
(k)
(l)
(m)
(n)
(o)
(p)
(q)
(r)
(s)

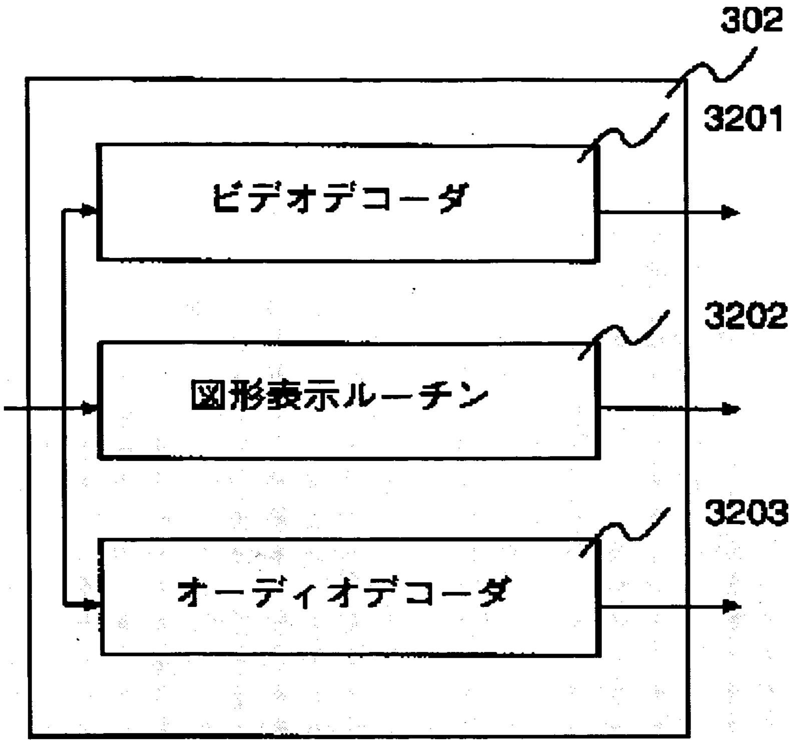
[Drawing 11]



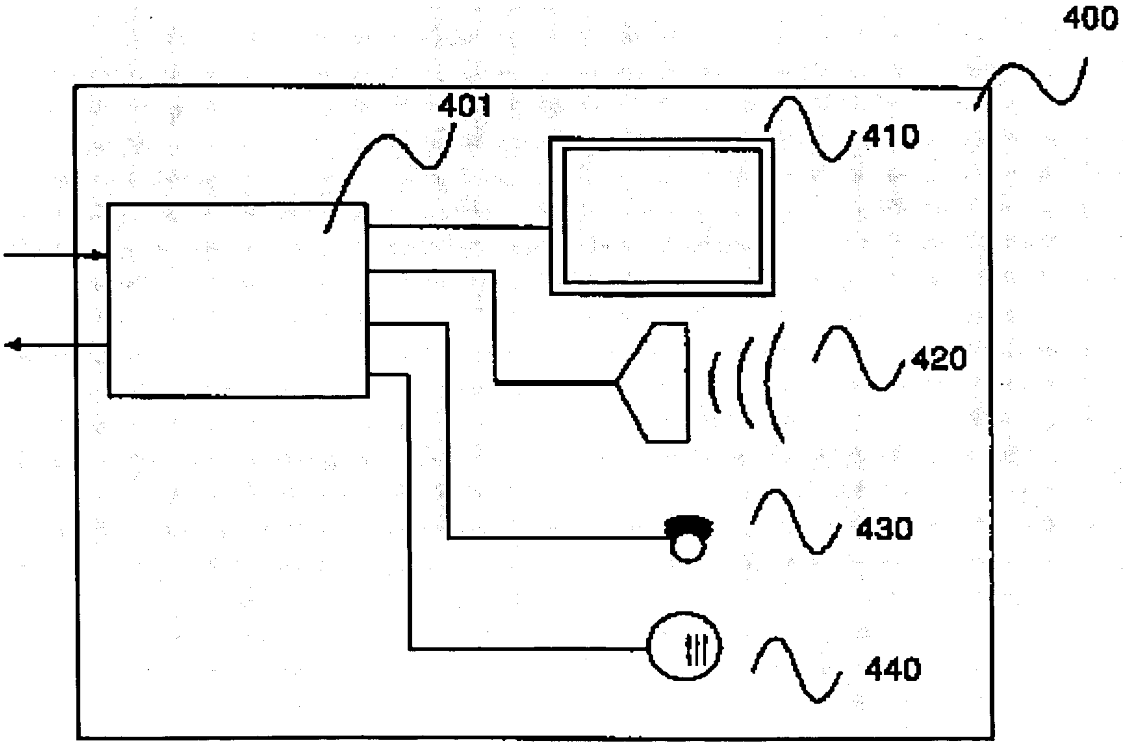
[Drawing 12]


3301
3302
同期信号受取部
制御信号出力部
3303
制御調停部
303

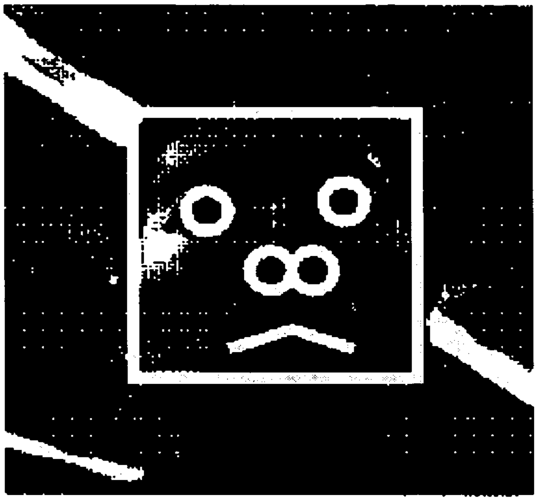
[Drawing 13]


302
3201
ビデオデコーダ
3202
図形表示ルーチン
3203
オーディオデコーダ

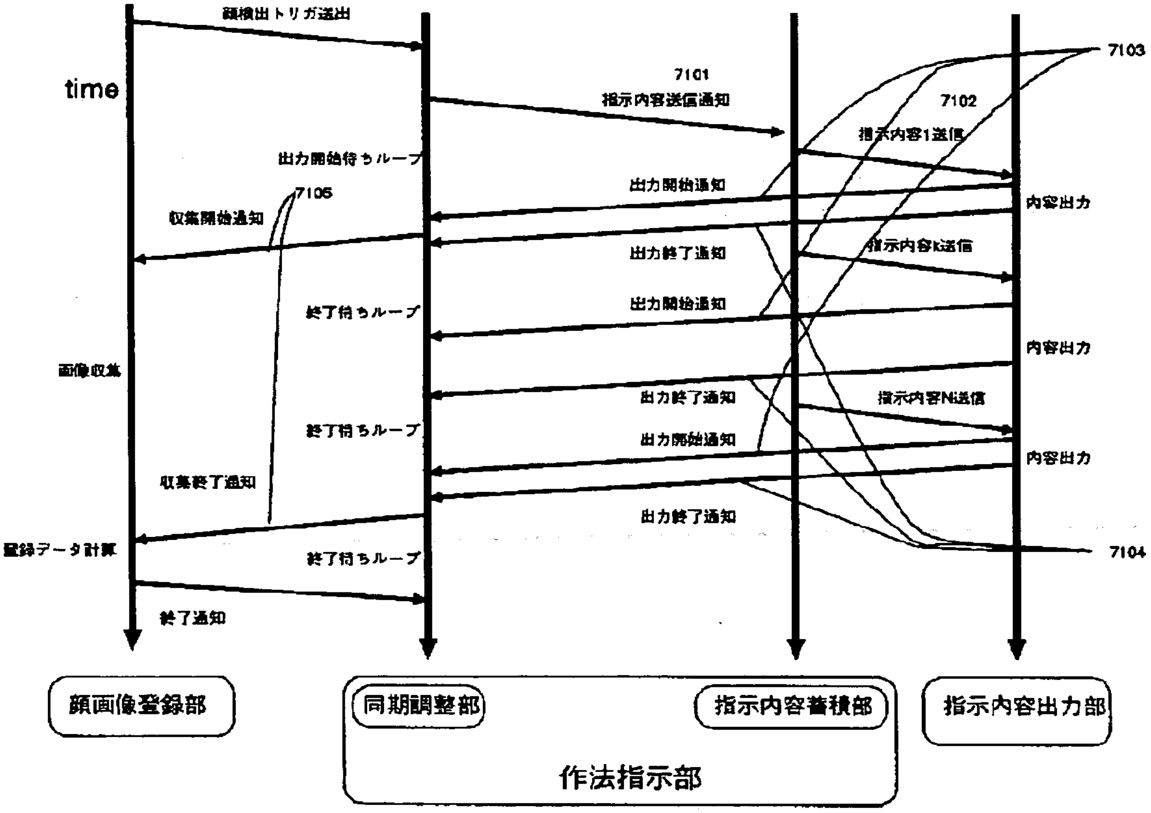
[Drawing 14]


400
401
410
420
430
440

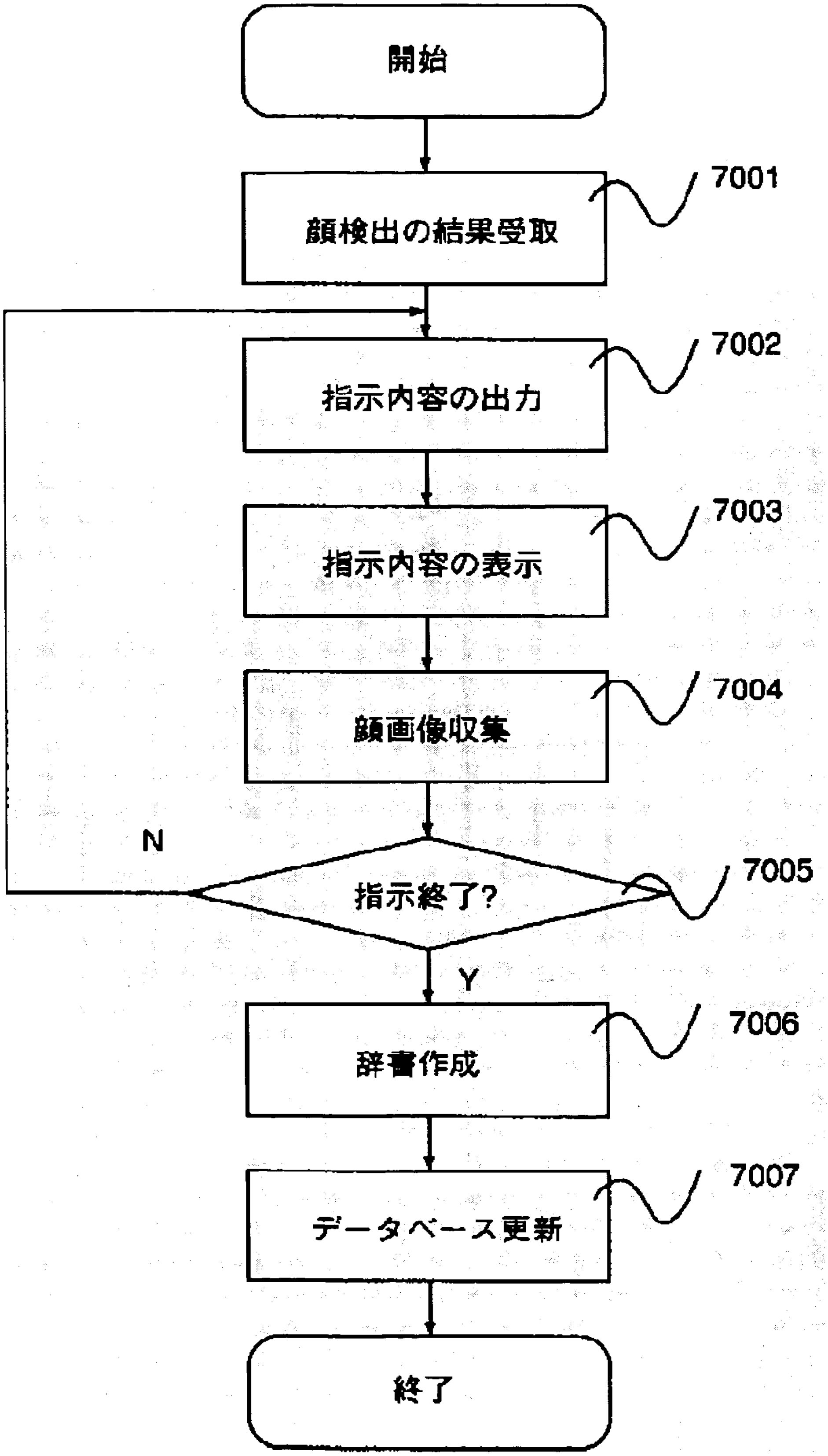
[Drawing 15]



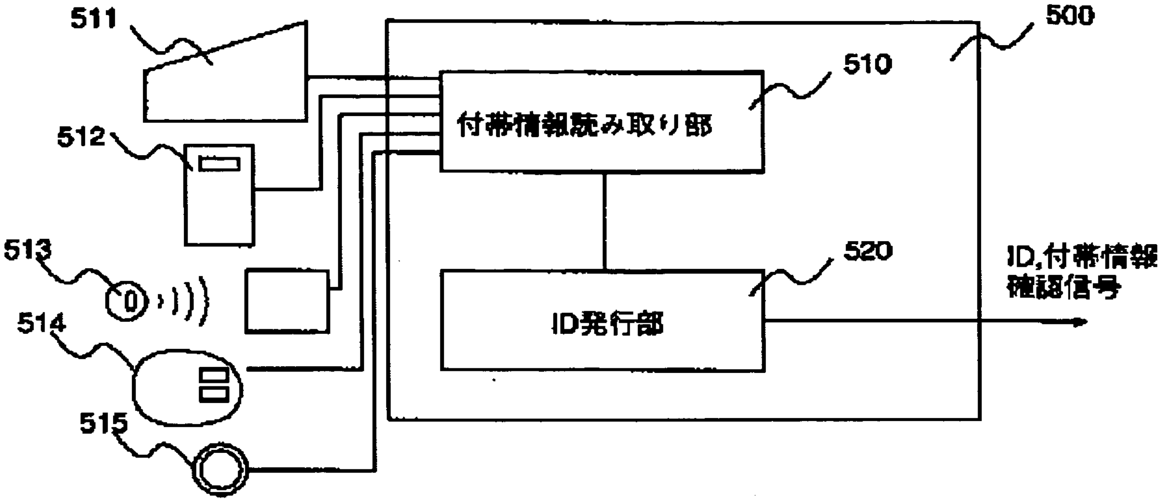
[Drawing 16]


顔検出トリガ送出
time
7101
指示内容送信通知
7103
7102
指示内容1送信
出力開始待ちループ
出力開始通知
内容出力
7105
収集開始通知
出力終了通知
指示内容k送信
終了待ちループ
出力開始通知
画像収集
内容出力
出力終了通知
指示内容N送信
終了待ちループ
出力開始通知
内容出力
収集終了通知
出力終了通知
登録データ計算
終了待ちループ
7104
終了通知
顔画像登録部
同期調整部
指示内容蓄積部
指示内容出力部
作法指示部

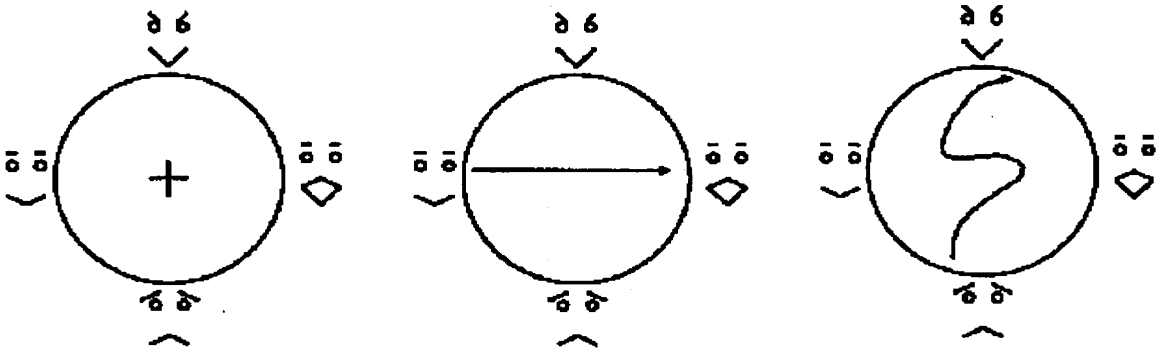
[Drawing 17]


開始
顔検出の結果受取
7001
指示内容の出力
7002
指示内容の表示
7003
顔画像収集
7004
N
指示終了?
7005
Y
辞書作成
7006
データベース更新
7007
終了

[Drawing 18]

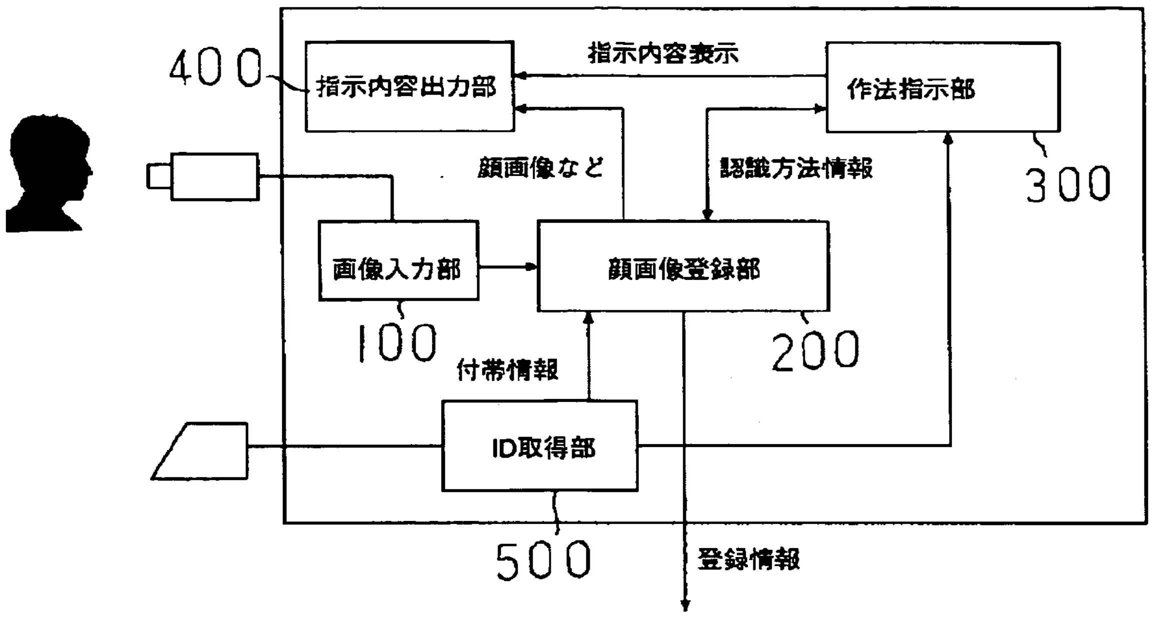

511
512
513
514
515
500
510
付帯情報読み取り部
520
ID発行部
ID,付帯情報
確認信号

[Drawing 19]



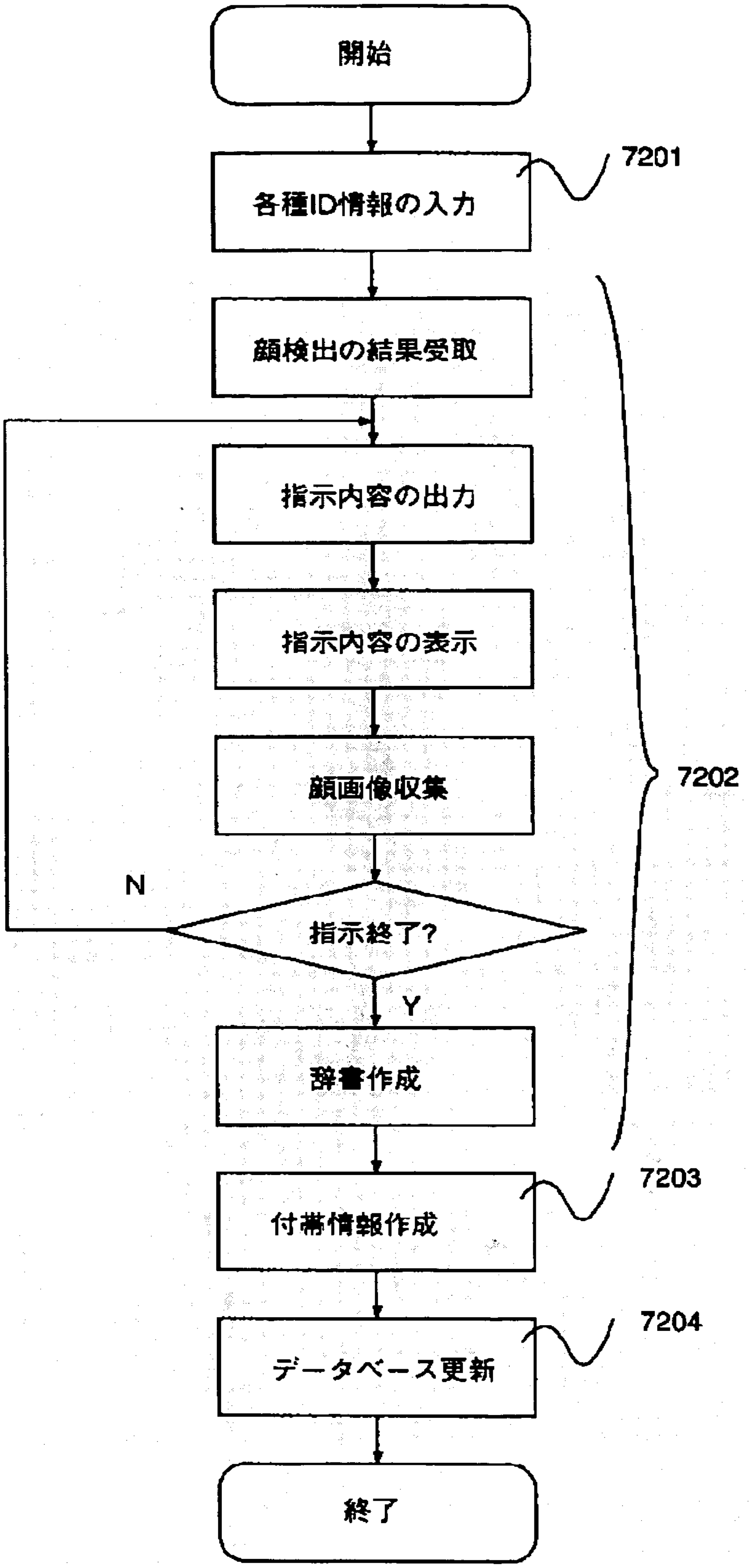
(a) (b) (c)

[Drawing 20]



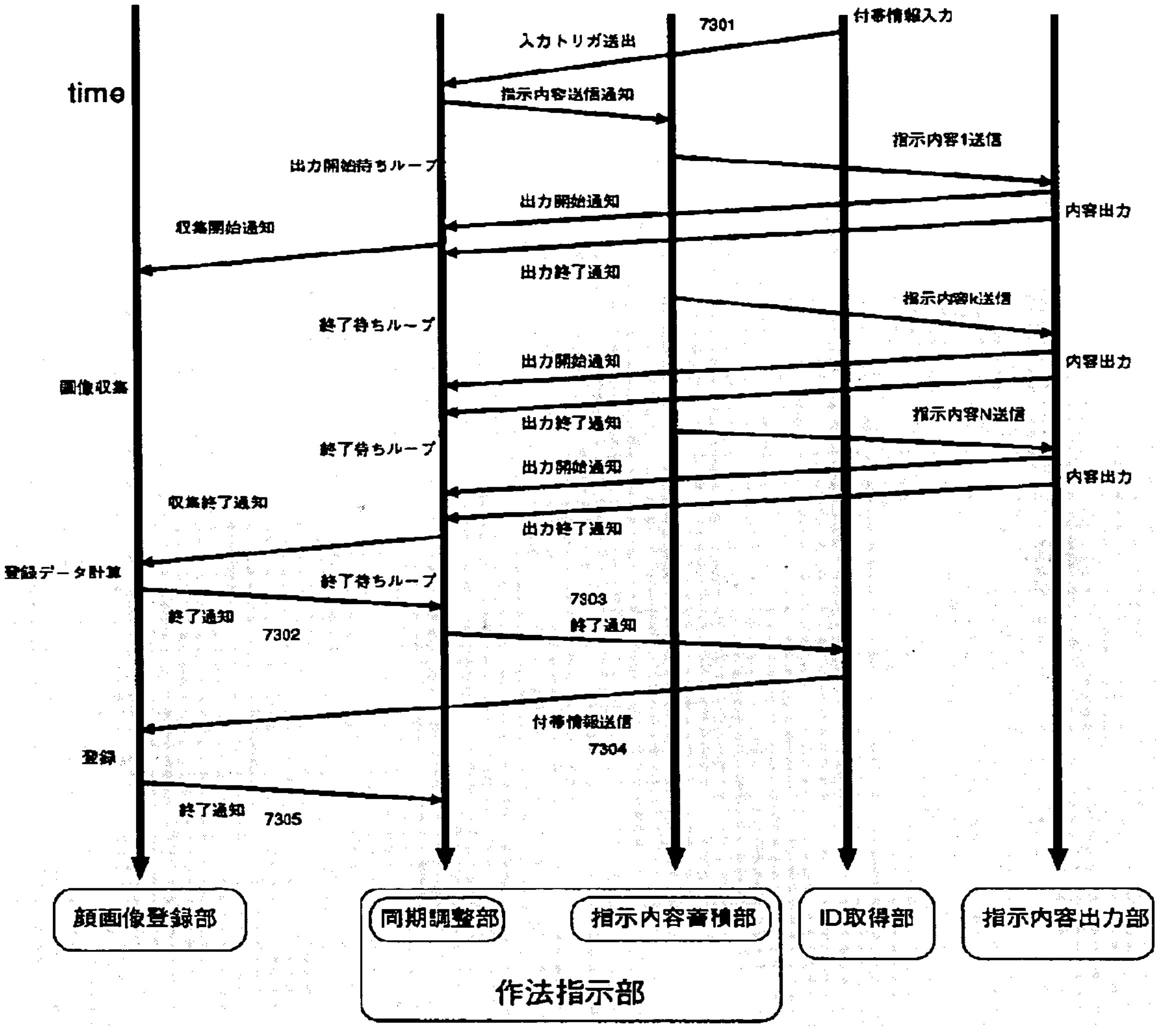
400
指示内容出力部
指示内容表示
作法指示部
300
顔画像など
認識方法情報
画像入力部
顔画像登録部
100
200
付帯情報
ID取得部
500
登録情報

[Drawing 21]

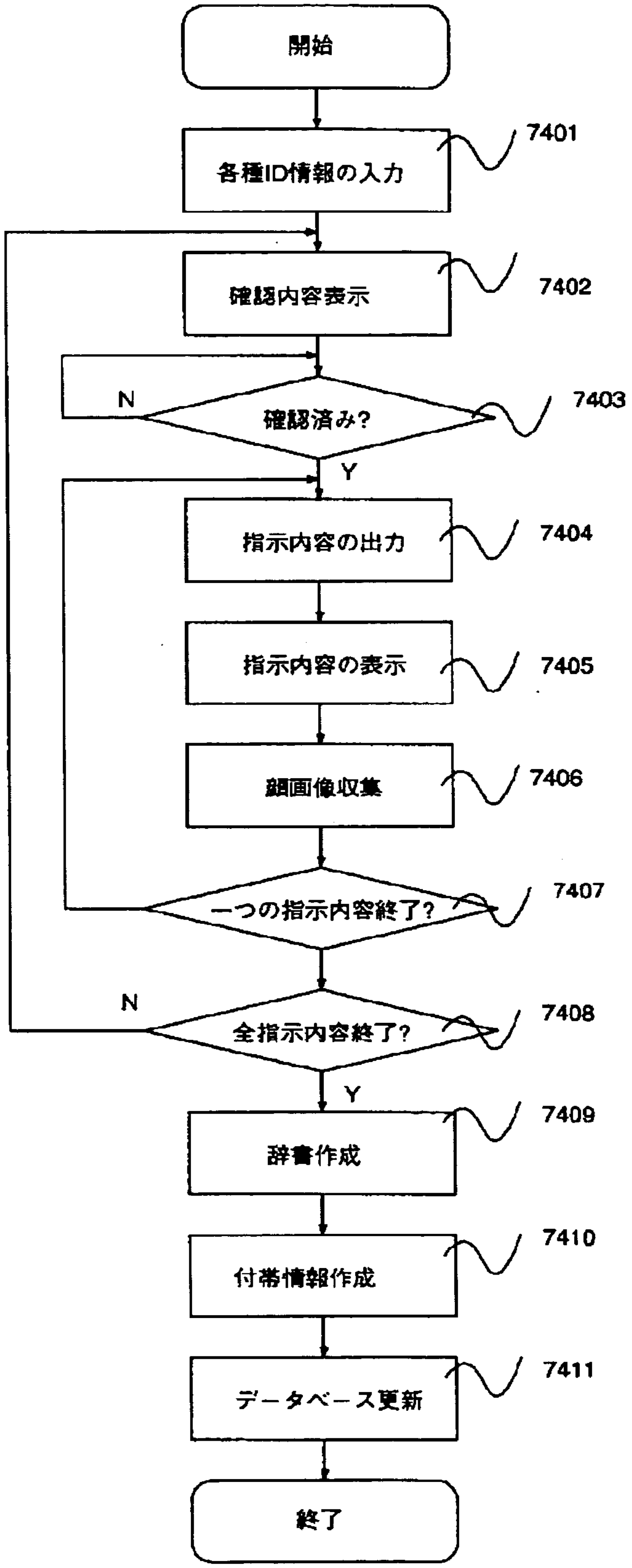


開始
各種ID情報の入力
7201
顔検出の結果受取
指示内容の出力
指示内容の表示
顔画像収集
指示終了?
N
Y
辞書作成
7202
付帯情報作成
7203
データベース更新
7204
終了

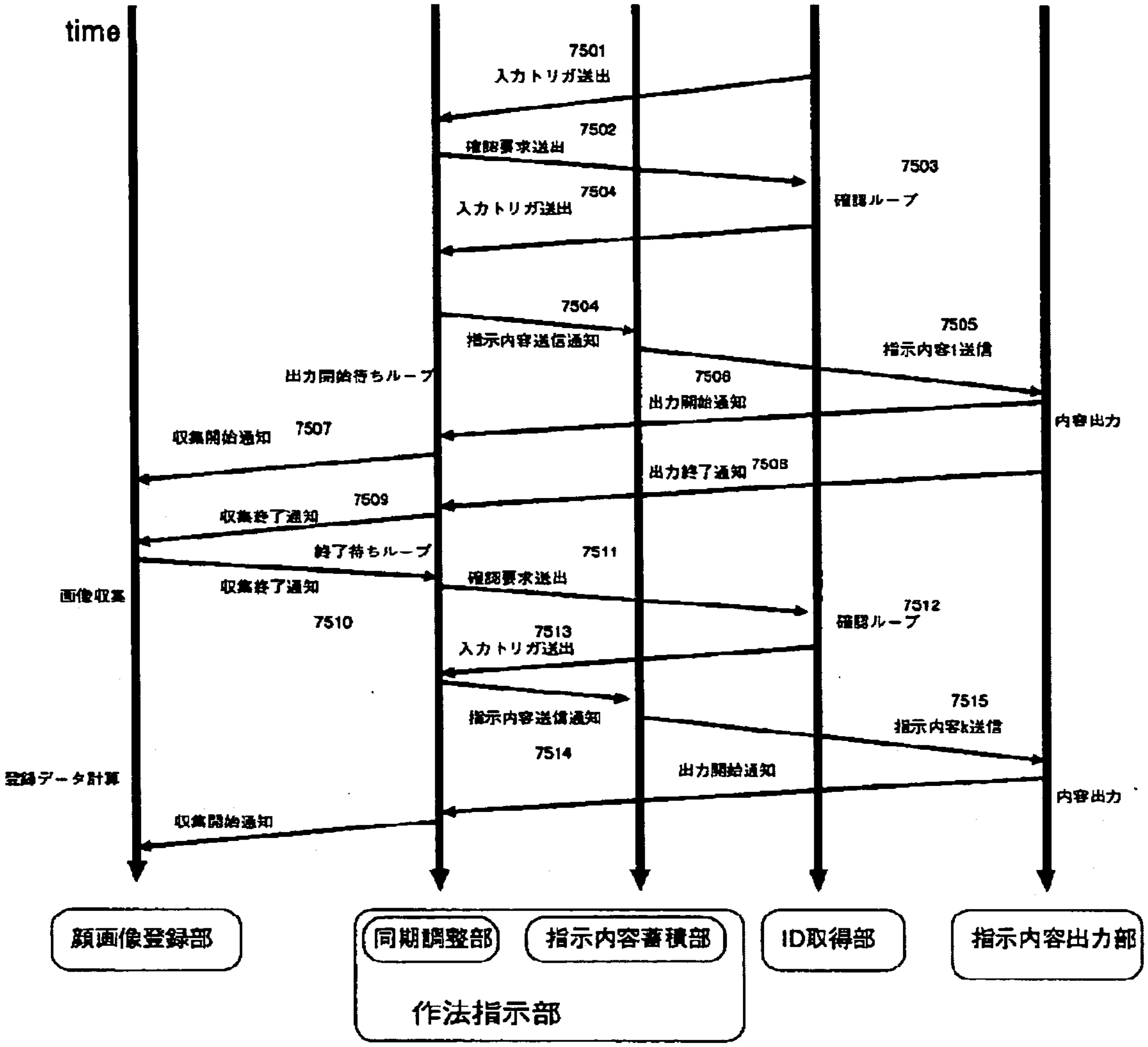
[Drawing 22]


time
付帯情報入力
7301
入力トリガ送出
指示内容送信通知
指示内容1送信
出力開始待ちループ
出力開始通知
内容出力
収集開始通知
出力終了通知
指示内容k送信
終了待ちループ
出力開始通知
内容出力
画像収集
出力終了通知
指示内容N送信
終了待ちループ
出力開始通知
内容出力
収集終了通知
出力終了通知
登録データ計算
終了待ちループ
7303
終了通知
7302
終了通知
付帯情報送信
7304
登録
終了通知
7305
顔画像登録部
同期調整部
指示内容蓄積部
作法指示部
ID取得部
指示内容出力部

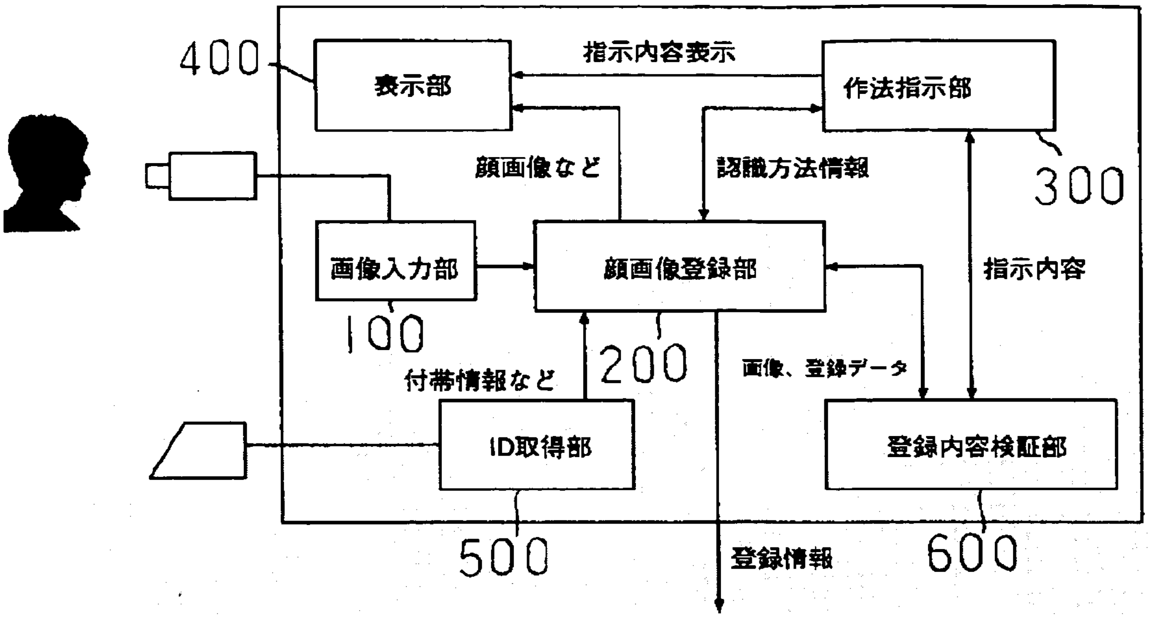
[Drawing 23]


開始
各種ID情報の入力
7401
確認内容表示
7402
N
確認済み?
7403
Y
指示内容の出力
7404
指示内容の表示
7405
顔画像収集
7406
一つの指示内容終了?
7407
N
全指示内容終了?
7408
Y
辞書作成
7409
付帯情報作成
7410
データベース更新
7411
終了

[Drawing 24]

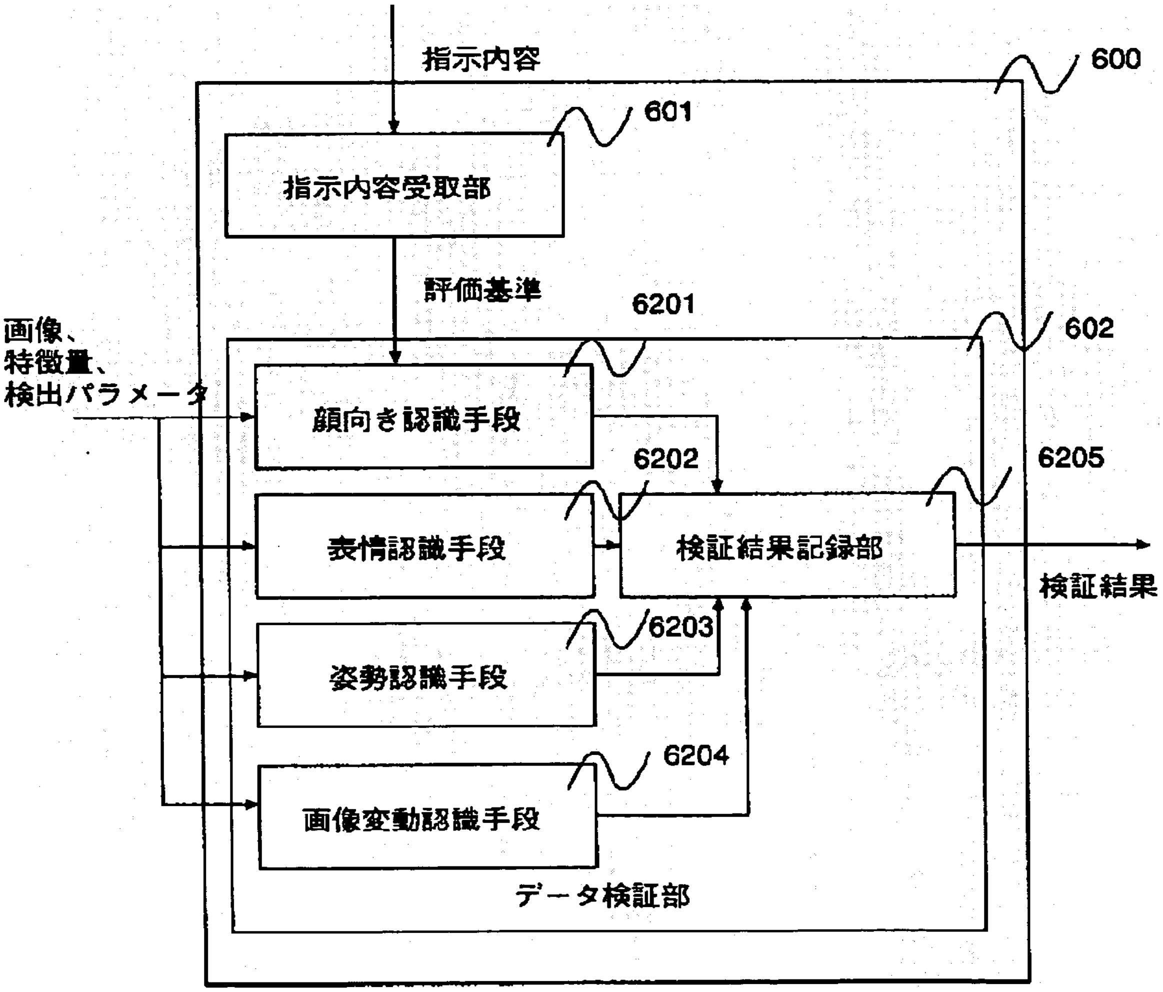

time
7501
入力トリガ送出
7502
確認要求送出
7503
確認ループ
7504
入力トリガ送出
7504
指示内容送信通知
7505
指示内容1送信
出力開始待ちループ
7506
出力開始通知
内容出力
収集開始通知
7507
出力終了通知
7508
7509
収集終了通知
終了待ちループ
7511
確認要求送出
収集終了通知
画像収集
7512
確認ループ
7510
7513
入力トリガ送出
指示内容送信通知
7515
指示内容k送信
7514
出力開始通知
登録データ計算
内容出力
収集開始通知
顔画像登録部
同期調整部
指示内容蓄積部
作法指示部
ID取得部
指示内容出力部

[Drawing 25]



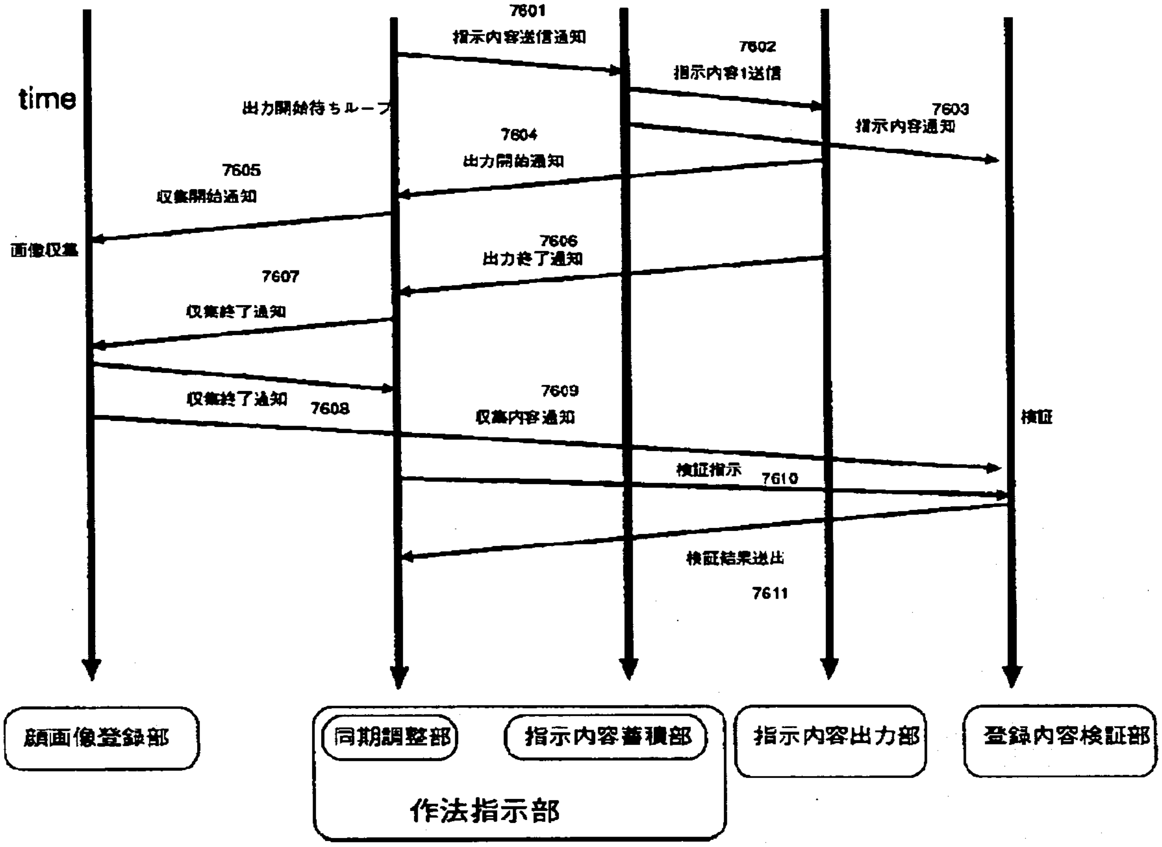
400
表示部
指示内容表示
作法指示部
顔画像など
認識方法情報
300
画像入力部
顔画像登録部
指示内容
100
200
付帯情報など
画像、登録データ
ID取得部
登録内容検証部
500
登録情報
600

[Drawing 26]

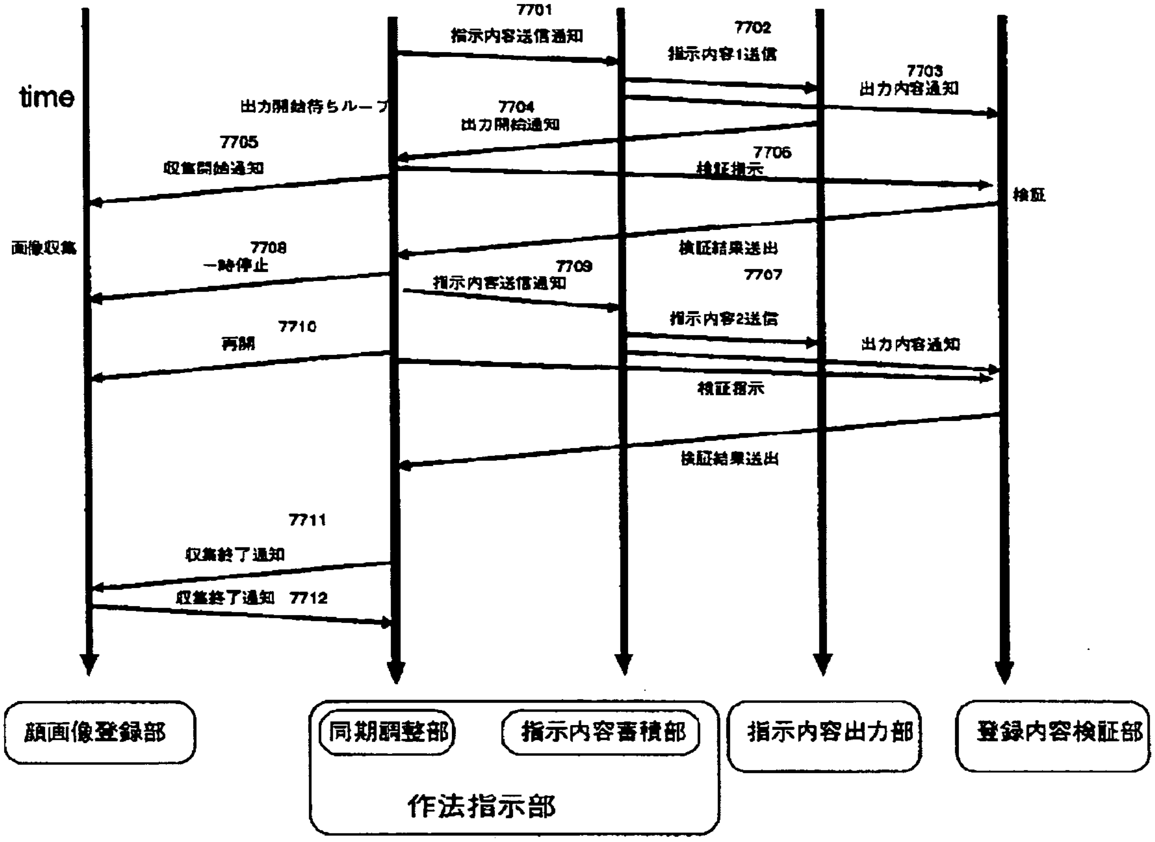


指示内容
600
601
指示内容受取部
評価基準
6201
602
画像、
特徴量、
検出パラメータ
顔向き認識手段
6202
6205
表情認識手段
検証結果記録部
検証結果
6203
姿勢認識手段
6204
画像変動認識手段
データ検証部

[Drawing 27]


time
7601
指示内容送信通知
7602
指示内容1送信
7603
指示内容通知
出力開始待ちループ
7604
出力開始通知
7605
収集開始通知
画像収集
7606
出力終了通知
7607
収集終了通知
収集終了通知
7608
7609
収集内容通知
検証
検証指示
7610
検証結果送出
7611
顔画像登録部
同期調整部
指示内容蓄積部
作法指示部
指示内容出力部
登録内容検証部

[Drawing 28]


7701
指示内容送信通知
7702
指示内容1送信
time
7703
出力内容通知
出力開始待ちループ
7704
出力開始通知
7705
収集開始通知
7706
検証指示
検証
画像収集
7708
一時停止
検証結果送出
7709
指示内容送信通知
7707
指示内容2送信
7710
再開
出力内容通知
検証指示
検証結果送出
7711
収集終了通知
収集終了通知 7712
顔画像登録部
同期調整部
指示内容蓄積部
指示内容出力部
登録内容検証部
作法指示部